

Conceptual Challenges in Cultural Selection

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This thesis is submitted for the degree of
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Abstract

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The aim of my thesis is to address key conceptual challenges within cultural selection, in order to provide a rigorous evaluation of its promise and scope. Cultural selection, a process analogous to natural selection which operates on cultural traits, has been proposed as an explanation for a wide range of phenomena. These include aspects of social institutions, technological change, and the widespread cooperative norms and behaviours that characterise human societies. There has been much work exploring the extent to which cultural systems can be said to be analogous to biological systems; however, I argue that cultural systems need not resemble biological systems in key respects in order for cultural selection to take place. Rather, the crucial question is not simply whether selection can apply to cultural systems in principle but what cultural selection can explain. In particular, cultural selection should bring meaningful explanatory benefits over and above those already offered by alternative frameworks, such as those from anthropology or history. I argue for skepticism regarding the explanatory power of cultural selection, through analysis of the ways in which cultural selection has been applied, the formal models and case studies used as evidence of cultural selection, and the social learning biases thought to underlie cultural selection processes.

In order to show that cultural selection can still operate even if cultural systems differ significantly from biological systems, I argue that cumulative selection can take place in populations without reproduction. However, even if cultural selection could operate in principle, this does not mean it generates explanatory benefits. In chapter 2 I show that cultural selection has been applied in ways that offer no explanatory payoffs, through close examination of cultural selection in the field of sustainability science. I then focus on cultural group selection in chapter 3, thought to be the most convincing form of cultural selection, arguing for skepticism regarding its scope and plausibility. Explanatory deficits extend to the social learning biases that underpin cultural selection: in chapter 4 I argue for skepticism regarding the existence of one such social learning bias, prestige bias. Additionally, inductive risk considerations provide further motivation for clarifying the explanatory potential of cultural selection. In chapter 5 I argue that a kind of inductive risk is present when we consider the adoption and pursuit of cultural selection, and this should encourage careful analysis of the expected explanatory gains before applying cultural selection frameworks further.

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Introduction

1. Evolutionary Approaches to Culture

Culture is central to human ways of life, and the existence of complex cultural systems that are built upon over time is arguably unique to the human species (Mesoudi, 2011; Whiten and van Schaik, 2007). A systematic definition of precisely what constitutes culture is difficult to articulate. The anthropologists Kroeber and Kluckhohn define culture as “patterns, explicit and implicit, of and for behaviour acquired and transmitted by symbols, constituting the distinctive achievements of human groups, including their embodiment in artifacts” (1952, 181). The cultural evolution researchers Richerson and Boyd define culture in their book *Not by Genes Alone* as “information capable of affecting individuals’ behaviour that they acquire from other members of their species through teaching, imitation, and other forms of social learning” (2005, 5). Whether we take an informational definition of culture or not, or whether a comprehensive and agreed-upon definition can be found, clearly there exists a large range of practices, behaviours, traits, and institutions that characterise human societies, differentiate human groups from one another, and structure the lives of individuals.

Although the existence of cumulative culture in itself may not be unique to humans (as Schofield et al, 2018 suggest), human societies demonstrate a remarkable capacity for developing sophisticated cultural traditions, practices and institutions that are transmitted across generations. From the late 19th Century and early 20th, Franz Boas and Alfred Kroeber argued relentlessly for the importance of culture as a distinct phenomenon of study, emphasising its critical role in the explanation of between-group differences. For Kroeber in particular, culture was a concept beyond the organic, “not just autonomous of biology, but its necessary counterpoint” (Fox Keller, 2016, 30).

However, perhaps in part due to dissatisfaction with the achievements of cultural anthropology and related social sciences, research programmes that can be broadly seen as “biologising” culture have developed over the past few decades, bringing the organic back into

the study of culture and cultural differences¹. This thesis focuses on one such approach, cultural evolution. Cultural evolution is a thriving research programme that broadly aims to use the tools of evolutionary theory to explain cultural phenomena. Early work within cultural evolution, such as *Cultural Transmission and Evolution: A Quantitative Approach* by Luigi Luca Cavalli-Sforza and Marcus Feldman (1981) and *Culture and the Evolutionary Process* by Peter Richerson and Robert Boyd (1985), set out to understand the population-level processes that give rise to cultural change through the application of mathematical models adapted primarily from population genetics and ecology. According to this ‘dual-inheritance’ approach, human behaviour is shaped both by genetic and cultural evolution, and modelling population-level processes of cultural transmission and inheritance can provide important insights into the spread and development of cultural traits (Richerson and Boyd, 1978).

Cultural evolution work differs importantly from other research programmes which also involve the application of evolutionary principles to human behaviour, such as sociobiology and evolutionary psychology. Sociobiology, which gained prominence following the publication of *Sociobiology: The New Synthesis* by the evolutionary biologist E. O. Wilson (1975), aimed to explain social behaviours as a product of natural selection. Evolutionary psychology builds upon the sociobiology framework, emphasising the importance for understanding human behaviour of psychological adaptations constructed through genetic selection. Tooby and Cosmides (1995) originally argued for the explanation of much of human behaviour through innate or hard-wired psychological ‘modules’, which were selected for during the Pleistocene. More recent evolutionary psychology work retains this emphasis on the capacity for psychological adaptations to explain human behaviour, while relaxing claims that the mind is entirely modular or that the strategy of considering the challenges of the ‘environment of evolutionary adaptedness’ will provide insight into the functional organisation of the human brain (Dunbar and Barrett, 2007, 5-6).

In contrast, cultural evolution research is typically concerned primarily with cultural rather than genetic inheritance, and places a particular emphasis on the role of social learning. For some cultural evolution researchers, genetically inherited modules may also have a role to play, and genetic and cultural evolution can interact in interesting ways. However, unlike

¹ Although some approaches taken to “biologise” culture do not resort to explaining cultural traits in terms of genetic or biological differences, the influence of biology comes from the source of the tools, methods and frameworks used.

evolutionary psychologists, cultural evolution advocates tend to carve out a distinct role for cultural transmission and inheritance. Although they use tools from evolutionary biology to explain aspects of culture, cultural evolution theorists take cultural phenomena as important objects of study in their own right, that often cannot be reduced to the genetic or biological. In this way, cultural evolution research perhaps could be seen to respect the critical and autonomous role of culture that Boas and Kroeber argued for, whilst using an evolutionary framework to understand this role.

Cultural evolution as a research programme can be said to be made up of various schools, with two main camps being the ‘California School’ (which includes the work of Peter Richerson, Robert Boyd, and Joseph Henrich) and the ‘Paris School’ (which includes the work of Dan Sperber, Olivier Morin, and Nicolas Claidière). Both these schools share a commitment to ‘population thinking’: they emphasise population-based explanations of cultural change or stasis. The hallmark of ‘population thinking’ is the abstraction away from particular features of individuals, in order to represent patterns of population change. In these models, individuals are typically represented as varying in a limited number of ways, and their interactions and decisions can be aggregated into population-level patterns. This way of thinking about and modelling culture represents an important break from some alternative approaches, including the practice of ethnography (a key tool within cultural anthropology). In contrast to a ‘population thinking’ approach, ethnographers typically attempt to capture cultural phenomena in high levels of detail, attending closely to individual differences. Proponents of cultural evolution have argued that the abstraction inherent in ‘population thinking’, and necessary for the use of mathematical models, will result in increased empirical and explanatory success in comparison to anthropological approaches (Mesoudi et al, 2006). Adopting a population thinking approach could allow us to see emergent population-level patterns that we would not have otherwise picked up on, allow for the development of formal models that predict patterns of change, and give us the capacity to construct generalisable principles from these models.

However, notwithstanding this key similarity, the Paris and California schools differ in their targets of explanation, their theoretical commitments, and their empirical methodologies. For example, the Paris school is often concerned with the endurance of particular traditions (i.e., why certain cultural traits persist and are repeatedly transmitted, while a vast number are not). They posit the role of ‘factors of attraction’, defined by Scott-Phillips et al (2018, 164) as “the factors that probabilistically bias how mental representations cause public productions

(and vice versa), and which hence cause cultural attraction to occur.” Cultural attraction here is the favouring of certain types of items or traits over others, which affects the frequencies of those items or traits in a population. These factors are shaped by features of human cognition and of the learning environment. Examples might include stories, jokes and folk tales: ‘factors of attraction’ have the potential to explain why certain forms reappear multiple times and endure in different traditions (Norenzayan et al, 2006). In contrast, the California school is often concerned with the appearance of ‘adaptive fit’ of a cultural trait with the environment, particularly in the face of causal opacity (which, they say, prevents individual learning from being successful). Many examples that the California school draw upon are of adaptations found in small-scale societies, such as particular ethnobotanical knowledge that allows those communities to effectively utilise environmental resources: these are cases where cultures differ, expressing adaptations specific to their circumstances and with clear utilitarian value (Sterelny, 2017).

In this thesis I focus mainly on the work of the California School, who have been the main proponents of cultural selection frameworks and models. Although some of the work carried out by Richerson, Henrich and Boyd does not involve the explicit invocation of cultural selection, and can instead be understood as broad ‘population thinking’, cultural selection models are a key component of their approach. Many of the formal models they have built, the examples they draw upon, and much of the empirical work they have carried out seek to characterise cultural phenomena as adaptations, built by cultural selection. Given the clear explanatory power and scope of natural selection in explaining adaptation in the biological world, an analogous process in culture could have the potential to bring many epistemic and practical benefits.

2. Cultural Selection

Evolution by natural selection has transformed our understanding of the biological world, providing a powerful explanation for the range of adaptations we see in biological organisms. Many aspects of culture seem similarly adaptive, in that they benefit individuals or groups, and allow us to thrive in a range of environments. Henrich (2015) gives the example of the Pama-Nyungan peoples in Australia: various aspects of their culture, including their ritual and foraging practices, were adaptive in the sense that they enabled the maintenance of large communities. In large-scale industrial societies, we could view a range of institutions as

having adaptive value: for example, the cultural norms of firms may contribute to their success on the marketplace, conservation laws may be adaptive in that they ensure the long-term sustainability of a particular resource, and adherence to social norms such as driving on the same side of the road allow large communities to coordinate their actions. Given this range of apparently adaptive behaviour, the application of selection to culture appears promising.

Cultural selection can be understood as an analogue of natural selection, where cumulative selection could lead to complex cultural adaptations. Cultural selection can be couched in terms of the Lewontin conditions: there is variation in cultural traits, these traits differ in their fitness, and there is a mechanism of inheritance (Lewontin, 1970). If these conditions are fulfilled, we would expect fitter traits to spread throughout the population. When this process is cumulative, we could see the generation of complex adaptations resulting from successive rounds of selection.

Cultural selection has been invoked to explain a wide range of cultural phenomena, including the spread of food taboos, the evolution of ethnic markers, the development of prosocial religions, and the broad cooperative norms and institutions that characterise human societies (Henrich and Henrich, 2010; McElreath et al, 2003; Norenzayan et al, 2016; Richerson and Boyd, 2005). Authors such as Joseph Henrich (2015) make the case that the success of the human species in thriving in a vast range of environments is due to our unique capacity for cumulative cultural evolution. He draws upon examples of failed European colonial expeditions, such as that of the explorers Burke and Wills, to show how important the cumulative cultural adaptations built up by indigenous people were to their survival. The fact that Europeans struggled to survive in those same environments, despite having the same innate cognitive capacities, is taken as an indication that it is the lack of cumulative cultural adaptations that determined their failure, rather than, for example, the kinds of mental modules posited by evolutionary psychologists. Richerson and Boyd (2005) similarly stress the power of cultural selection to build cultural adaptations. Their work has included the development of formal models to show that, given certain assumptions regarding cultural transmission and inheritance, beneficial norms could spread through populations through selection (e.g., Boyd and Richerson, 2002, 2009; Boyd et al, 2011a).

Additionally, cultural selection theorists have utilised multilevel selection frameworks to explain core cultural phenomena. Multilevel selection theory proposes that selection does not

only act upon the individual, but can act at multiple levels of organisation, such as the group. Sometimes selection is held to act at several levels at once. In fact, some authors believe cultural group selection to be the most plausible version of cultural selection, given aspects of group differences and group inheritance (Sterelny, 2006a, 2017). Although group selection is a contentious topic within evolutionary biology, with many researchers claiming it cannot be an important force in explaining biological adaptations (e.g., West et al, 2008), cultural selectionists assert that unique features of culture make cultural group selection far more plausible than biological selection. Cultural group selection has been invoked to explain these broad cooperative tendencies that make human societies successful, as well as a range of group traits and institutions that structure human social interaction.

According to these researchers, the existence of universal social learning biases plays a key role in cultural group selection: they allow for the maintenance of within-group variation and the minimisation of between-group variation, both of which are important for cumulative adaptive evolution at the level of the group. The social learning biases proposed by authors such as Richerson, Boyd and Henrich are typically unconscious biases which structure social learning, and are either biased in terms of content (what traits are learnt and transmitted) or models (which individuals in a community are learnt from). Two key examples of model biases are conformist bias, the tendency for individuals to disproportionately copy the most common variant in the population, and prestige bias, the tendency for individuals to copy the most prestigious individuals in the population (Creanza et al, 2017). In addition to playing a key role in cultural group selection models, social learning biases are critical to the cultural selection approach more generally. For example, social learning biases can, in principle, maintain fidelity of transmission in the face of error-prone learners, to levels necessary for stable inheritance of cultural traits over generations (Muthukrishna et al, 2018).

Although cultural selectionists do not rely on genetic adaptations to straightforwardly explain human behaviour as evolutionary psychologists do, there are cases where cultural change may result in genetic change. An oft-cited example of gene-culture coevolution is the spread of lactose tolerance, where changes in agricultural practices led to selection for the gene for production of the lactase enzyme into adulthood (Feldman and Laland, 1996; Richerson et al, 2010). Another possible example of genetic adaptation being driven by cultural adaptation is Richerson and Boyd's 'tribal social instincts hypothesis', which proposes that humans have allegiances and instincts on a tribal level, rather than simply towards kin. These social instincts are supposedly critically important in explaining the scope and extent of human

cooperation. These instincts were first shaped by cultural selection, but then came to have a genetic basis. They propose a process of cultural selection acting at the level of the group, favouring those tribes which had norms and institutions that encouraged high levels of cooperation and prosocial behaviour. This cultural selection was then followed by genetic assimilation, where genes that supported these behaviours were selected for, in the form of hardwired instincts, so that these social instincts now form part of our innate psychology and are reliably reproduced (Richerson and Boyd, 2005, 214-235).

However, many cases of cultural selection do not involve any genetic change whatsoever. Additionally, its explanatory scope is not limited to broad cooperative tendencies in our deep past: cultural selection has been proposed as a way of understanding modern-day phenomena such as the behaviours of firms in a marketplace, the diffusion of technological innovations, and changes in conservation institutions (Richerson et al, 2016; Henrich, 2010; Waring et al, 2015). If the claims of cultural selection proponents were true, then cultural selection could be a powerful force in understanding many aspects of cultural phenomena: both the origin of universal tendencies that have shaped human societies over millennia, as well as the development of key social institutions that structure human interaction, and ongoing changes in current norms and practices.

Cultural selection overall forms a significant strand of the broader cultural evolution research programme. If cultural selection could successfully be used to explain everything that its proponents have wanted to apply it to, then it could be a powerful force in shaping how we understand culture. However, I will establish in this dissertation that significant conceptual issues remain unresolved that mean that cultural selection in its current form does not bring the promised epistemic and practical dividends.

3. Key Challenges

Many debates over the potential of cultural selection and cultural evolution have revolved around the coherence of core concepts within cultural evolutionary theory, such as fitness and inheritance. For instance, it is unclear whether cultural fitness should, for example, refer to biological fitness of the bearer of the trait, or to the extent to which the trait itself can spread through the population (as in the programme of memetics, an early version of cultural evolutionary theory that ran into many well-founded critiques). This issue is interlinked with

other conceptual problems, such as how to define generations within cultural selection. Authors have, varyingly, stressed the importance of a precisely-defined cultural fitness concept (Wilson, 1999), argued that we can eliminate cultural fitness altogether (Selten, 1991), argued that the lack of a cultural fitness concept is a reason to discount cultural evolutionary approaches (Gabora, 2011), and proposed a pluralist and pragmatic conception of cultural fitness (Ramsey and De Block, 2017). Additional debates include disagreement over whether cultural evolution can truly be considered ‘Darwinian’, or whether it is in fact ‘Lamarckian’, given the role of guided variation (Kronfeldner, 2007). We see similar confusion around what constitutes cultural reproduction, and whether cultural traits are ‘replicated’ or ‘reconstructed’ when they are transmitted (Sperber, 1996).

However, I suggest that the focus on similarities between cultural and biological systems is misplaced. In Chapter 1 I use the case of reproduction to argue that cultural systems can differ in significant respects from biological systems, and yet still be capable of undergoing cumulative selection. I argue that cumulative selection can, in principle, build adaptations in cultural systems that lack reproduction. We should take this as an indication that the most pressing question regarding the potential of cultural selection should not be the extent to which we can map on biological concepts to cultural phenomena. Rather, what matters most in our assessment of cultural selection is its explanatory payoffs. I suggest that these explanatory questions are at the very least as important as, and perhaps more important than, questions regarding the definition of certain core concepts. To consider the situation in evolutionary biology, we see similar philosophical confusion over concepts we take to be central to natural selection, such as fitness (Ariew and Lewontin, 2004), what constitutes a Darwinian population (Stegenga, 2014), and whether we should construe natural selection statistically or causally (Walsh et al, 2002). However, deep conceptual disagreements have not prevented natural selection from being an incredibly powerful explanation for adaptation (as well as other features of biological populations, such as the maintenance of stable polymorphisms). I suggest that cultural selection should be treated in the same way: we should focus on assessing what the particular explanatory gains are from cultural selection frameworks in order to determine whether they are a useful way of understanding culture, and we can expect explanatory gains even in the absence of systematically defined core concepts².

² Hull (2000, 49) makes a somewhat similar argument in the context of his defence of memetics, suggesting that lack of conceptual clarity surrounding core concepts should not be too worrying, and instead we should focus on testing the framework.

Much work within cultural selection has justified the appropriateness of invoking cultural selection in any given case through reference to the ‘necessary conditions’ for selection (typically, the Lewontin conditions). For example, Richerson et al (2016) in their argument for the importance of cultural group selection, frame their argument explicitly in terms of these conditions, aiming to show that cultural groups vary, that they have fitness differences, and that cultural traits are inherited. Similarly, Mesoudi et al (2004) intentionally structure their argument for Darwinian cultural evolution to mirror that of *The Origin of Species*, arguing for variation, competition and inheritance in cultural phenomena. Here, cultural selectionists are focused on whether cultural phenomena can be minimally understood to fulfil these necessary conditions, and this is taken directly as evidence for the action of cultural selection in these cases.

This focus on the necessary conditions for cultural selection to take place has meant that too often the question is “whether we can” rather than “why we should”. These two questions may have different answers: we could interpret the necessary conditions for cultural selection in a broad and permissive way, so that a wide range of cultural cases could be said to meet these conditions. However, this will often come at the expense of explanatory power. It may be entirely possible to describe a case in selection terms, without offering any additional explanatory insights. Given that these two questions are separable, focusing on whether cultural phenomena fulfil necessary conditions for selection should not be taken as evidence that cultural selection is a useful framework. This is particularly the case when considering the broader context of cultural selection, or cultural evolution, approaches: these relatively recently developed research programmes are just one way of understanding culture, in a sea of alternative frameworks. Cultural anthropology is one key alternative, with cases of purported cultural selection often relying on previous accounts of the same phenomena constructed by anthropologists. Alternative approaches also include those from history, sociology, and economics. Given this context, it is important to make the explicit case that cultural selection offers something that these programmes do not.

In Chapter 2 I use the example of the application of cultural selection to the field of sustainability science in order to provide a demonstration of the ways in which cultural selection models have been applied, whilst yielding little to no explanatory payoffs. One possible response to the use of this case is that of ‘cherry-picking’: perhaps there are issues with the cultural selection literature as applied to sustainability science, but these problems

do not extend to wider efforts to develop cultural selection work. I address this response directly in Chapter 3, by analysing the explanatory payoffs of cultural group selection, and in particular the formal models and case studies proposed by key figures in the field. Cultural group selection has been cited by authors such as Kim Sterelny (2006a) as the most plausible kind of cultural selection, and has been invoked to explain widespread features of human societies. Therefore, understanding what cultural group selection processes can and cannot explain is crucial to the assessment of the cultural selection project more generally. I argue for skepticism regarding the explanatory potential of cultural group selection.

Problems with the explanatory payoffs of cultural selection extend not only to its application, formal modelling work, and core case studies, but also to the processes that are supposed to underpin it. Cultural selection relies upon the existence of universal social learning biases, which direct social learning in systematic and predictable ways. In Chapter 4 I argue that the empirical evidence cited in favour of one key social learning bias, prestige bias, is questionable, and that the status of prestige bias as an explanation for observed phenomena is weak compared to a goal-directed agent explanation. This is not only an issue for cultural selection work, but also for ‘population thinking’ approaches to culture more generally.

A final important strand of resistance to cultural selection approaches comes from non-epistemic concerns. Cultural selection, and cultural evolution more broadly, is treated with deep skepticism by many cultural anthropologists, although there has been little formal engagement or critique. Tim Ingold, one of the most forthright critics of cultural evolution, has argued against cultural evolution both on epistemic grounds, for its dismissal of the achievements of cultural anthropology as a discipline, and for the way it represents humans as entirely lacking in agency (Ingold, 2007). However, the criticisms from cultural anthropologists have largely been ignored by those working in cultural evolution.

The lack of engagement with criticisms from cultural anthropology means that it is difficult to get a hold on what is at issue in the disagreement, and whether these criticisms could be productively incorporated into our assessment of cultural evolution. In Chapter 5, I consider the kinds of concerns levelled by anthropologists such as Tim Ingold, and in particular, non-epistemic concerns regarding the characterisation of individuals in cultural selection. I use the inductive risk framework to highlight how decisions must be made regarding whether to pursue or adopt cultural selection research, and how values inevitably enter into those decisions. This framing is a way to understand the role of values, and thereby the social and

political concerns that appear to be a feature of the disdain of cultural anthropologists for cultural evolution, in a way that does not offer these values a ‘direct’ or ‘illegitimate’ role (where social and political values are straightforwardly a reason to dismiss cultural evolution, a position which may be distasteful to many working in the field). The advantage of this framing is to make sense of the concerns of cultural anthropologists in a way that could be taken up by cultural selection researchers. Furthermore, these non-epistemic considerations give additional motivation for carefully considering expected explanatory gains.

4. Layout of the Thesis

Chapter 1: Cultural Adaptation without Reproduction

I argue that reproduction is not necessary for cumulative adaptive evolution, contrary to the claims of authors such as Samir Okasha and Peter Godfrey-Smith. I argue that the features of reproduction that are commonly invoked as reasons for why reproduction is central to adaptive evolution are either not necessary or can be instantiated in cultural systems without the presence of anything resembling a reproductive process at the level of the units of selection. In particular, continuous production of novelty is the key feature that is necessary for cumulative adaptive evolution. Whilst this is typically tied to the reproductive process in biological systems, this can come apart from reproduction in cultural systems.

The case of reproduction indicates that cultural systems need not resemble biological systems in key ways, and still be able to undergo cumulative adaptive evolution. However, this does not mean that invoking cultural selection will necessarily bring meaningful explanatory payoffs.

Chapter 2: What Can Cultural Selection Explain?

Although cultural systems can differ significantly from biological systems and still be able to undergo cumulative selection, that does not mean that understanding cultural change or cultural phenomena in selection terms offers any additional explanatory gains.

There has been a lack of attention in the literature to the explanatory benefits of cultural selection frameworks, particularly in comparison to alternative ways of understanding cultural

phenomena, such as models from anthropology, sociology, history, and economics. I use the case of the application of cultural selection models to sustainability science to demonstrate how these models have been applied in ways that offer no explanatory gains over and above alternative frameworks. Therefore, even if selection models can in principle be applied to cultural phenomena, there may be many cases where they offer no explanatory power, and therefore there is no reason to develop selection models of phenomena already successfully explained by anthropological or social scientific frameworks.

I suggest that explicit consideration of the kinds of cultural phenomena that are underexplained by alternative frameworks is necessary for cultural selection to bring epistemic and practical benefits.

Chapter 3: What Can Cultural Group Selection Explain?

These explanatory concerns are not limited to the application of cultural selection in sustainability science, or in fields such as innovation. In fact, they extend to the broader cultural selection literature, including cultural group selection, a form of cultural selection that has been invoked to explain the supposedly unique nature of human cooperation. I examine the three cultural group selection processes that have been proposed by Richerson and Boyd: intergroup competition, selective imitation, and selective migration. I argue for skepticism about the explanatory payoffs of all three of these processes.

Cultural group selection processes are typically supported by formal modelling and the use of case studies. The issues with these processes are threefold: firstly, these processes sometimes do not turn out to have much explanatory payoff, even if we grant that their assumptions hold; secondly, certain simplifying assumptions are doing a lot of the work in driving the interesting results generated by cultural group selection models, and once these are questioned it is unclear what the explanatory benefits would be; and thirdly, key cases used in support of these processes are in tension with the ethnographic record in ways that bear importantly on the explanatory power of cultural group selection in these cases.

Chapter 4: Rethinking Prestige Bias

Explanatory concerns affect not only the formal models and case studies used as evidence of cultural selection, but also to the processes taken to underpin these frameworks. Social

learning biases are a key aspect of the cultural selection project. These unconscious biases structure who is learnt from or what is learnt, allowing for the generation of systematic population-level patterns of cultural change. Additionally, they are necessary for the maintenance of between-group variation and the minimisation of within-group variation, which is key for cultural group selection to get off the ground.

Lewens (2015) has argued for skepticism regarding the plausibility of conformist bias. I examine the plausibility and scope of another key social learning bias, prestige bias. Prestige bias is typically understood as the tendency for individuals to learn from, and thereby acquire the cultural traits of, more prestigious individuals in their community. I argue that the phenomena to be explained are not clearly defined, and bear an uncertain relationship with the general notion of prestige. Additionally, the phenomena as actually studied as part of prestige bias research are often truncated or pruned in deference to prestige bias theory, which widens the gap with ordinary understandings of prestige and bias. Lastly, the observational evidence is at least as well explained by a general goal-directed agent model.

Chapter 5: Inductive Risk in Evaluating Cultural Selection

Finally, I argue that non-epistemic considerations should provide further motivation for pinning down the explanatory payoffs of cultural selection. The potential negative social and political consequences of the pursuit of cultural selection research or the adoption of cultural selection frameworks licenses the raising of the evidential or explanatory bar. I use the concept of inductive risk to show that, if non-epistemic consequences do arise from the pursuit of adoption of cultural selection, then we must balance these consequences against possible epistemic benefits.

The decision to pursue or adopt cultural selection involves the balancing of ‘false positives’ against ‘false negatives’, as in classic inductive risk cases. How we set the evidential threshold in this case depends on how we balance the two. This shows a clear indirect role for values in assessing cultural selection, which cannot be avoided. I then demonstrate these non-epistemic consequences do arise by sketching out some potential social and political impacts, including the ‘flattening’ of complex cultural concepts in mathematical models, the diminishment of human agency which feeds into a process of ‘othering’, and the dangers of selection connoting progress.

This both shows that non-epistemic consequences do arise and therefore values have a role to play in assessing cultural selection, as well as providing additional motivation for close consideration of the expected explanatory gains of cultural selection.

In sum, my thesis aims to show that pinpointing the explanatory payoffs of cultural selection is the most crucial aspect of an assessment of the promise of cultural selection. I demonstrate the ways in which cultural selection has been applied whilst failing to provide explanatory payoffs, and show that this extends to the formal models, case studies, and empirical presuppositions of cultural selection frameworks. Additionally, non-epistemic considerations should further encourage scrutiny of the explanatory benefits of cultural selection in comparison with alternative approaches to culture.

Chapter 1

Cultural Adaptation without Reproduction

1. Introduction

One might imagine that the application of evolutionary models to cultural phenomena relies upon an analogy between biological and cultural systems. Difficulties with fleshing this out have been highlighted as one of the core issues with memetics, a version of cultural evolutionary theory which draws a strong analogy between cultural variants and genes. Critics of memetics argue that cultural units are not replicators, that cultural units do not form lineages, and that cultural units are not discrete and separable in the way that genes are (an overview can be found in Lewens, 2018). Even when we let go of this close analogy between cultural variants and genes, we are still faced with the question of how analogous cultural systems must be to biological systems in order for cultural selection approaches to get off the ground. For example, Gabora (2011) argues that the lack of a coherent cultural fitness concept is a major stumbling block for cultural evolution, and Aunger (2006) argues for the need to identify what cultural inheritance is in cultural evolution. Clarke and Heyes (2017) suggest that cultural selection needs to be explicit regarding the entities that are reproducing, as well as what fitness means in these models. This work has a common theme: that particular characteristics of biological systems thought to be necessary for selection should be present in some way in cultural systems in order for selection models to apply. In this chapter I examine one facet of biological systems often taken to be crucial for natural selection: reproduction.

Is reproduction necessary for selection? Reproduction appears to be a universally shared feature of biological organisms: the ways in which organisms replicate, reproduce or perpetuate themselves are enduring features of the biological landscape. Although reproduction appears to occupy a central role in biological evolution, the question of whether it is necessary for adaptive evolution, rather than simply selection more generally, is disputed.

It is straightforward to imagine populations without reproduction that appear to undergo selection, at least in principle. One classic example is that of a slab of granite which is made

up of different grains, which differ in resistance to erosion (Van Valen, 1989). Over time, the least resistant grains will be eroded away, and what will be left are the surviving set of grains (those with the highest resistance). Therefore, we see a progressive increase in the average resistance to erosion in the population of grains of granite. In this case there is no reproduction, there is only persistence. Here, it seems clear that the change in the distribution of the trait of hardness in population of granite grains results from selection on hardness. However, the selection we see in this example is not the kind that is capable of producing adaptations: it appears to be of a marginal or weak kind. This is because it cannot act cumulatively: new variants cannot arise in the population, which build on existing variation. Additionally, because selection acts by eliminating less fit variants, if there is no way to replenish the number of individuals, the population is ultimately doomed to extinction.

The grains of sand example shows that a selection-type process can occur without reproduction. The question of whether reproduction is necessary for cumulative, adaptive evolution is far more contentious. Some authors make the claim that “selection on entities that do not reproduce their kind is not very interesting, and will not lead to adaptation” (Okasha, 2006, 214). The claim here is that, although reproduction may not be necessary for marginal or weak kinds of selection, for the kinds of creative adaptation-building that characterises much of biological selection, reproduction is necessary.

Resolving the question of whether cumulative adaptive evolution requires reproduction is important for two reasons. Firstly, the project of building a generalised, domain-neutral evolutionary theory necessitates abstracting away from the particulars of biological entities to get at the heart of the machinery of natural selection. Biological reproduction is a multifaceted and complex process, so here this means separating the functions or aspects of reproduction that are necessary for cumulative adaptive evolution (if any) from the aspects that have been shaped by the contingent histories of life on earth. The way biological organisms reproduce has itself been shaped by natural selection, drift, and other evolutionary processes. Therefore, we would expect some of the features of biological reproduction to be specific to the history of biological life, while some may be necessary for selection in any domain.

Secondly, and relatedly, the relationship between reproduction and the generation of adaptation through selection has direct implications for assessing the scope and plausibility of prominent forms of cultural selection. If cultural selection models are to be appropriate and

useful ways of understanding culture, cultural entities (whether they be groups, individuals, artefacts, or ideas) need to be the kinds of entities that can undergo cumulative adaptive evolution. This is because the usefulness of cultural selection as an explanatory tool relies on the extent to which aspects of culture can be understood as adaptations, built by cumulative evolution. For example, Richerson and Boyd (2005,80) stress what they argue is the unique capability for human culture to “accumulate changes over many generations, resulting in culturally transmitted behaviors that no single human individual could invent on their own”. Henrich (2015) emphasises cumulative cultural evolution as a key driver of our success as a species. Richerson et al (2016) claim that cultural group selection has an important role to play in understanding a range of phenomena, including the broad cooperative norms and behaviours that underpin human societies, as well as the development of particular aspects of culture, such as competition between firms. Therefore, the explanatory power of selection-based approaches to culture comes from the capacity for cultural selection to be of the ‘interesting’, adaptation-building, creative kind.

Some authors (e.g., Godfrey-Smith, 2009), take the lack of a plausible reproduction process in most cultural cases to be a worrying limitation. However, if we can get adaptation without reproduction, then these concerns lose their force. Clarifying the importance of reproduction for adaptive evolution has significant implications for cultural evolution research.

Additionally, and reciprocally, considering cases of cultural evolution can shed light on the role of reproduction. There may be evolutionary relevant features which, in biological populations, are only brought about through reproduction, although not necessarily so. We can use cultural populations to aid in examining whether these features are intrinsically tied to the production of new individuals, or are separable and can in fact be instantiated without reproduction.

I begin by outlining the features of reproduction that have been proposed as vital to cumulative adaptive evolution: material overlap, parent-offspring lineages, multiplication, and production of novelty. I argue that material overlap, parent-offspring lineages, and multiplication are not necessary for cumulative adaptive evolution, and therefore cultural populations that lack these are still capable of generating adaptations. I argue that what is needed for the generation of interesting adaptations is the production of novelty and the preservation of novel adaptive variants. However, these features can be achieved without a process resembling reproduction, i.e. without a process in which a new individual is produced from one or more distinct parent individuals. This not only clarifies the role of reproduction

in a generalised, domain-neutral evolutionary theory, but also suggests that at least one important criticism of cultural selection is misplaced.

2. Defining Reproduction

Before showing that cumulative adaptive evolution can occur without reproduction, I will first outline the definition of reproduction I will be using. There are debates within biology and philosophy of biology over how we can define reproduction in a systematic way so as to accommodate certain ‘problem cases’ (e.g., Clarke 2010, 2011). In the biological context, delineating between growth and reproduction is not always clear, as can be seen in ‘problem cases’ such as that of the quaking aspen. The quaking aspen has the option of either reproducing sexually (producing genets), or growing what, on the surface, look like new individuals, by clonal production of shoots that remain connected to the original individual. The new vertical stems that arise are termed ramets. This can result in what looks like a forest of separate individual trees, but which all remain physically connected underground, sharing nutrients and water, and are genetically identical. The question of whether ramets are separate individuals is a question of how we should distinguish between reproduction versus growth.

Although I will not attempt to address these debates here, the distinction between reproduction and growth does have relevance to the role of reproduction in cumulative evolution. For example, in cases where smaller size is an advantage, and smaller individuals produce more offspring than larger individuals, the larger size of some individuals does not seem to factor into the evaluation of evolutionary success. Here, the relevant metric is the production of offspring, not the production of mass. However, this view has not gone unchallenged. For example, Bouchard (2011), claims that physical size is in fact important to natural selection, and that the physical size of a single organism can in some cases say more about its evolutionary fate than its reproductive success.

One ‘working definition’ of reproduction as typically understood in the biological context is the production of a new individual, primarily through the causal role of the parent or parents, where the offspring individual is of the same kind as the parent individual(s) (and also has the capacity to reproduce). The grey areas between reproduction and non-reproductive growth, or the production of waste and artifacts, show there is no comprehensive or entirely systematic definition of reproduction. Nevertheless, when authors

such as Samir Okasha and Peter Godfrey-Smith assert the necessity of reproduction for cumulative selection, they take the lack of a reproductive process resembling this ‘working definition’ in, for example, cultural systems, as an obstacle for cumulative evolution. Here I will not attempt to provide a systematic definition of reproduction that would solve ‘problem cases’ such as that of the ramets and genets of the quaking aspen. Rather, I will take the ‘working definition’ used by authors such as Okasha and Godfrey-Smith, and ask what the significance of this process is for cumulative adaptive evolution. There may be edge cases in both the biological and cultural realm which this working definition does not adequately capture. However, I will argue that there are cases in the cultural realm that clearly fall outside of even a broad definition of what constitutes a reproductive process, but where cumulative adaptation seems possible, showing that reproduction is not necessary for cumulative evolution. Additionally, the extent to which cultural phenomena are capable of undergoing cumulative cultural selection and generating cultural adaptations, is not dependent on the extent to which reproduction is possible.

It is certainly the case that all, or almost all, of the complex adaptations that we see in biological organisms have been produced by populations that reproduce. Additionally, the examples often cited as instances of selection on persistence (in populations that cannot reproduce) appear to show that without reproduction, selection cannot act cumulatively, and therefore cannot produce complex, interesting adaptations.

However, some authors have argued that selection on persistence *can* be interesting, and can lead to cumulative adaptation. Some such arguments have been made in defence of the process of clade selection, i.e. the differential persistence of clades due to clade-specific properties (e.g., Doolittle, 2017). There is no process of clade reproduction, and the concept seems even logically incoherent (Okasha, 2006). This is because clades are by definition monophyletic: they include all the descendants of an ancestor or ancestral group. Logically, monophyletic clades cannot have ancestor-descendant relations. Any speciation or lineage splitting events will only grow the clade; no ‘clade offspring’ can be created with an independent existence from the clade they belong to. Therefore, the power of clade selection as a driver of adaptations in clades also partially depends upon the importance of reproduction to selection.

What the distinction between selection with reproduction and selection on persistence hinges upon is the functions of reproduction. The task of assessing the role of reproduction in a generalised evolutionary theory requires breaking reproduction down into its component

parts, i.e. separating out features that are relevant to evolution by natural selection from the features that have arisen out of the contingent ways biological life on earth has developed to perpetuate itself. I will argue that the necessary features can be present in populations without a process that we would recognise as reproduction (i.e. without production of new individuals of the same kind as the parent individual(s), through the causal action of the parent individual(s)). It may be that reproduction is one, perhaps very reliable, way, to ensure these features are present, but not the only way. In particular, I will argue that reproduction *at the level of adaptation* is not necessary. There may still be reproduction at lower levels, but not reproduction at the level of the unit of selection.³

Different authors pick out and emphasise different features of reproduction as vital to selection, and some authors have attempted systematisations of features and types of reproduction and reproducing entities. The key functions that appear repeatedly in the literature are: material overlap, parent-offspring lineages, multiplication, and the production of novelty. This chapter will take each of these functions in turn. I argue that material overlap, parent-offspring lineages, and multiplication are not necessary for the generation of cumulative adaptation. Production of novelty is necessary; however, it can be achieved through processes other than what we would term reproduction. This means that cultural systems can lack a reproductive process and yet still be capable of undergoing cumulative adaptive evolution.

3. *Material Overlap*

Griesemer (2000) identifies ‘material overlap’ as a key feature of reproduction relevant to evolution by natural selection. Here, ‘material overlap’ refers to the process whereby the “organized physical parts of parents at one time become the organized physical parts of offspring at other times” (ibid, 539). Griesemer argues that material overlap is a good way of

³ For example, in sexually reproducing biological organisms, we generally take reproduction at level of the organism to be necessary for cumulative selection and therefore adaptation. If we have a population of fruit flies which simply persist for a certain length of time, and we do not allow them to reproduce, we would not expect that population to be able to undergo cumulative evolution. This is despite the fact that there will be reproduction at a lower level (at the level of the cell). However, as will be drawn out further in Section 5, we can have reproduction at the level of the individual human but no reproduction at the level of the group - and yet, I will argue that human groups can undergo cumulative cultural selection.

ensuring reliable transmission of the capacity to develop; packing structure into a material propagule stabilises the transmission process, rather than relying on the stability of the external environment. He contrasts reproduction that involves material overlap with mere ‘copying’, where structure is transmitted from an original to a copy, but without a genealogical relationship caused by material overlap. According to Griesemer, in cases of ‘copying’, we would require a highly complex external environment in order for stable and reliable transmission of the original to the copy. In contrast, the existence of material overlap in most biological systems means that the channel conditions can be very simplified, while still ensuring faithful transmission.

For Griesemer, this means that we should expect ‘nonreproductive copying systems’ to have significantly different evolutionary dynamics from biological reproducers. However, it is unclear what these dynamics would be. Possibly, we would expect lower fidelity in the transmission of traits, but this seems more of difference of degree than of kind. Additionally, this expectation would only hold if the external environment was not complex enough to ensure stable transmission.

Although material overlap is a key aspect of biological reproduction, it does not seem difficult to imagine a process in a different domain that has all the other evolutionarily relevant features of reproduction, is strongly analogous in most other senses, and yet lacks material overlap. All else being equal, we would expect entities in this domain to be able to undergo cumulative selection.

Even within the biological context, material overlap is not always present. Godfrey-Smith (2009) notes the existence of cases of ‘formal reproduction’, where there is material influence, but no material overlap. Retroviruses, for example, are able to synthesise DNA from their own RNA genome, which is then incorporated into the host genome. The viral DNA is transcribed and translated by the host cell machinery, creating more viruses. Here there is no ‘material propagule’ which is transferred, although the structure is transmitted in a way that allows for the propagation of the original individuals. Despite the lack of material overlap, there appears to be clear Darwinian evolution occurring, with small variations being reliably passed on.

One way of reconciling arguments for the importance of material overlap with cases of formal reproduction is through reference to processes of scaffolding: although there may be systems in which reproduction of entities in a population under selection does not involve material

overlap, these entities may depend on, or are scaffolded on, entities that do reproduce via a process involving material overlap. For example, in the case of cultural selection, it could be argued that human brains have adaptations for adopting and transmitting culture, and these adaptations have at least partly been shaped by previous biological or genetic selection. In this way the reliability of cultural inheritance is ‘scaffolded’ by features of brains that have been built by cumulative selection on a system with material overlap. This kind of scaffolding is directly analogous to examples of formal reproduction such as retroviruses, where the reproduction is scaffolded by cellular machinery.

Scaffolding can also stabilise reproduction in another sense: Wimsatt and Griesemer (2007, 230) describe “functional developmental scaffolding” which can act to lower “fitness barriers” to variants, make new behaviours or variants accessible to individuals, and entrench and stabilise variants within populations. These scaffolds often take the form of institutions and frameworks, which channel the development of variants and so constrain and shape cultural inheritance. This can be understood using Griesemer’s contrast with ‘copying’: as there is no material overlap in these cases, we need a highly complex external environment (for example, in the form of sets of institutional norms and behaviours) to shape and channel the inheritance of particular cultural variants reliably. It may be the case that both types of scaffolding play a role in ensuring reliability of transmission.

It may (or may not) be the case that Griesemer is correct in that evolving systems without material overlap depend *on some level* on systems that do exhibit material overlap. That is, if we burrow down far enough, retroviruses depend on cell machinery built by cumulative selection on entities which reproduce with material overlap. Similarly, evolving entities in the cultural domain (whether that be norms, behaviours, artefacts, individuals, or groups), depend on brains built by cumulative selection on entities which reproduce with material overlap. However, what cases of formal reproduction make clear is that material overlap in reproduction within the population under selection is not necessary for cumulative adaptation. Material overlap could have some part to play in the story of the production of cumulative adaptation, but the lack of material overlap need not be a cause for concern for, for example, cases of cultural evolution. What is crucially important about material overlap is that it achieves reliability and stability of transmission, but these features themselves can be ensured without material overlap *within the reproduction of entities in the population in question*.

4. *Parent-Offspring Lineages*

It is often assumed that parent-offspring lineages are necessary for cumulative evolution. For example, Peter Godfrey-Smith (2009, 2012) emphasises the importance of parent-offspring lineages to the capacity for cumulative adaptive evolution. For Godfrey-Smith, two, and perhaps three, four, or even several, parents, will still produce the parent-offspring lineages required for cumulative adaptation. However, he argues that when there are too many ‘parent’ individuals making contributions to the production of offspring, we lose the capacity to trace back the contributions that each ‘parent’ individual made to the offspring, and cumulative selection is no longer possible.

In particular, Godfrey-Smith regards the lack of parent-offspring lineages as a significant challenge for cultural evolution. He claims that in order for Darwinian processes to be operating in culture, there is a strong requirement for a particular kind of causal responsibility on the part of past lineages, of the kind that leads to reproductive lineages and the possibility of heredity. Under this requirement, we might think that only certain kinds of strict imitation (which form teacher-learner lineages) have the capacity to be shaped by a Darwinian process⁴. His claim is that when general intelligence intervenes too much during learning, so that a large set of models are blended and added to by individuals, then the necessary pattern of parent-offspring lineages is lost, and we can no longer understand the change as Darwinian. It is for this same reason that Sterelny (2006b) argues that the best candidates for Darwinian populations in culture are artefacts, which may in principle be scaffolded reproducers (requiring humans for their propagation). In particular, Sterelny refers to cases where new artefacts are copied from one (or a small number of) previous artefacts: the key aspect of artefact evolution for Sterelny is that they seem to have a limited number of parents.

In some cases of cultural evolution we do see parent-offspring lineages. The fissioning of groups can create distinct lineages, with one parent and one offspring group. However, there are also many cases where parent contribution is less clear. For example, individuals may acquire cultural variants by observing a large number of individuals, some of which are attended to more than others, and so the parental contribution is difficult or impossible to estimate. Given that the vast majority of individual cultural transmission does not involve

⁴ For example, where an apprentice observes an artisan crafting a particular tool and imitates their behaviour, producing a tool similar to the one they observed. In this case there is one cultural parent (the artisan, or the tool itself), and so we are able to trace the lineage.

the strict imitation that gives rise to parent-offspring lineages, and that only some kinds of cultural groups form these lineages, a lot is at stake for cultural selectionists, when it comes to the importance of parent- offspring lineages for cumulative selection.

4.1 Populations without Lineages

Charbonneau (2014) argues that the primary functions that lineage-forming reproduction accomplishes are multiplication and inheritance, and in fact both of these can be obtained without parent-offspring lineages. His use of the term ‘multiplication’ here means the ‘renewal of population parts’, in order that populations do not eventually face extinction. The population function of inheritance is memory: that is, the retention of change in the distribution of variation in a population across generations. He argues that these are population-level processes, and can be obtained without the local-level processes that form traceable parent-offspring relations between individuals.

Charbonneau uses the thought experiment of a population of bacteria in a laboratory, which are artificially synthesised and do not reproduce by themselves. The individuals in this bacterial population differ in their resistance to a certain compound, which is introduced by the experimenter. After each round of exposure to the compound, where the least resistant variants are disproportionately killed off, and therefore the distribution of the variants changes, the experimenter counts the number of each bacterial variant and has the relative frequencies of each variant in the population at every round. Then, rather than the existing bacteria multiplying, the experimenter uses this information to recreate the population with the stored information about the distribution of variants. Therefore, the change in the population due to selection in each round of exposure is preserved, and can be built upon. Although this is an idealised scenario, it shows that local-level processes that establish definite parent-offspring relations between individuals are not strictly necessary to ensure the population-level process of inheritance. This differs from a Godfrey-Smith style ‘formal reproduction’ process in that, in this scenario, for any given bacterium, there is no answer to the question, ‘who is its parent?’. However, in terms of the selection dynamics at play (i.e., the capacity for selection to build complex, cumulative adaptations), they are exactly the same as in a typical bacterial population with traceable parent-offspring lineages, due to the preservation of the population-level property of the frequency distribution of variants.

We can construct a potential real-life example of cumulative adaptation without parent-offspring lineages if we consider a cultural case. Take an example of individual transmission

(and, for this example, individual cultural selection), where individuals can acquire a given norm from a wide range of sources. Parents, friends, and teachers can and often do all contribute to the acquisition, development and expression of a particular norm in a given individual. This norm can be modified and reinforced during an individual's lifetime, through various channels and by various individuals. For Godfrey-Smith, this is a clear indication that the trait in question is not amenable to Darwinian analysis. However, let us imagine a scenario where a new variant of a cultural norm emerges within a population, and a few individuals adopt it. The individuals that adopt the variant are more successful than those who do not. To clarify the notion of success here, it is not intended to be defined in terms of having more offspring or the variant itself having more progeny, but rather some general measure, perhaps relative to the function of the variant. For example, a more successful variant of a boat-making procedure would be one which produces boats that are less likely to sink. Those that observe the success and choose to adopt the new variant are not doing so on the basis of copying any one individual. In this example, the decision to adopt the variant is based on observation of all or many successful individuals, to varying degrees. As the number of individuals that adopt the variant grows, the pattern of parentage becomes more and more diffuse. Eventually, the variant reaches fixation in the population. When a new variant arises that improves on the previous variant, the process repeats itself. This looks to be a case of cumulative selection, similar in structure to Charbonneau's example.

Godfrey-Smith (2012) asserts that we can still see cumulative cultural adaptation at a certain level without parent-offspring relations at other levels, distinguishing between 'micro', 'meso', and 'macro' levels of cultural change. For Godfrey-Smith, as long as we have parent-offspring lineages forming at, for example, the 'meso' level, this is sufficient to generate Darwinian patterns of change and adaptation. However, what both the Charbonneau example and the cultural case show is that parent-offspring lineages *at the level of adaptation* are not in fact necessary for the production of complex cumulative adaptations. In fact, we may lack parent-offspring lineages at either the micro or the meso level, and still see cumulative adaptation. What is needed for selection to act cumulatively is the preservation of trait frequency distribution over time, so that the action of selection at one time point is not lost to future selection.

The following two features, multiplication and the production of novelty, are often invoked together, as crucial elements of reproduction, without which we cannot have cumulative adaptive evolution. However, it is important to separate out the two distinct functions, as

although they are found together in biological reproduction, they can come apart and be instantiated in different ways in other contexts. Additionally, I will argue that they can be achieved without any of the other features we consider integral to reproduction (i.e. production of a separate offspring entity, due to the causal contributions of parent entities), partly due to unique features of culture.

5. Multiplication

Differential lineage extinction, though technically a form of selection, is not enough in itself to generate progressive evolutionary change. Lineages maybe 'survivors', but this does not make them replicators. Grains of sand are survivors. Hard grains, made of quartz or diamond, will last longer than soft grains made of chalk. But nobody has ever invoked hardness selection among sand grains as the basis for an evolutionary progression. The reason, fundamentally, is that grains of sand do not multiply. One grain may survive a long time, but it does not multiply and make copies of itself. Do species, or other groups of organisms, multiply? Do they replicate?

- Dawkins, 1982, 152

Dawkins, in the context of assessing the merits of species selection, uses the example of grains of sand to argue that multiplication is necessary for cumulative selection. Indeed, the above passage indicates that multiplication is the chief criterion for assessing the capacity of entities to undergo adaptive evolution.

Selection is a process that necessitates the winnowing of less fit variants, so a population with no means to replenish its numbers will be doomed to extinction. This could be perceived as a strong argument for the necessity of reproduction, and why selection on persistence (like the grains of sand example that Dawkins invokes) has often been considered 'uninteresting', or unlikely to lead to cumulatively built, complex adaptations. Godfrey-Smith (2009) asserts that even cases where each parent individual produces a single offspring individual (so there is production of new entities but no multiplication) is unlikely to lead to 'interesting' evolution. Following this, the role of multiplication is not only a process that ensures the population does not dwindle to extinction, but also feeds into the production of novelty: multiplication, according to these authors, produces more 'independent platforms', from which novelty can arise (Godfrey-Smith, 2012, 2166).

5.1 Multiplication in Cultural Groups

In some cultural populations multiplication is rare or limited, such as in cultural groups. If we think about the typical spread of an individual cultural variant, the adoption of that variant by other individuals could be considered a kind of multiplication process. However, a significant strand of cultural selection research focuses on cultural group selection (e.g., Richerson et al, 2016). When considering cases of cultural group selection, groups of humans (which may be spatially delineated or delineated by ethnic markers) are the units of selection, and the ‘cultural population’ here is the population (or meta-population) of groups. There are some documented cases of group ‘reproduction’, such as the Faiwolmin groups in Papua New Guinea, where group fission occurs once the group grows to a certain size (Soltis et al, 1995). This means that more successful groups exhibit growth and higher rates of offspring group formation, and less successful groups are more likely to face extinction. However, we would expect this kind of group reproduction to be relatively rare.

Often the examples cited by cultural group selection advocates, such as that of the Nuer and the Dinka groups in 18th and 19th Century Sudan, involve no multiplication of groups (Richerson and Boyd, 2005). In the narrative constructed by Richerson and Boyd, the Nuer and Dinka were two large ethnolinguistic groups, that were each made up of several smaller, somewhat independent groups. According to the way this case is described by Richerson and Boyd, the Nuer were more successful in military confrontations with the Dinka, which resulted in Nuer invasion of Dinka lands and assimilation of many Dinka into Nuer groups. This was a result of a set of group-beneficial cultural norms that gave the Nuer a selective advantage in these confrontations. One example of such a norm is the higher bride prices in Nuer groups compared to Dinka groups; this necessitated alliances between households, which resulted in military advantages⁵. In this case, evolution is measured as change in traits of groups over time, comparing the same group at different time slices, rather than offspring groups with parent groups.

According to authors who advocate for the necessity of multiplication, multiplication plays two key roles that allow for cumulative adaptive evolution. Firstly, the replenishment of entities within a population (so that the population is not doomed to extinction), and secondly, the production of novelty. However, I argue that these can both be instantiated

⁵ Potential problems with the case of the Nuer and Dinka are discussed further in Chapter 3. However, the key issues stem from explanatory payoffs of understanding this case, rather than the in principle capacity for the Nuer and Dinka groups to undergo cumulative selection.

without the presence of anything resembling reproduction. In these cases, there is reproduction occurring (of individuals within the group), although, crucially, there is no group reproduction (so, no reproduction at the level at which adaptations are being generated).

5.2 Multiplication and Replenishment

Firstly, in the case of human cultural groups, due to the nature of these groups, there can be selection at the group level, with whole groups becoming extinct, and yet the number of individual humans in the population does not diminish (and continues to grow). For example, this will occur when individuals switch group membership, or a whole group is assimilated into another group and adopts their norms and behaviours. Richerson et al (2016) describe three cultural group selection processes thus: selective migration between groups, selective imitation of successful groups, and natural selection (or intergroup competition). Selective migration occurs when migrants disproportionately immigrate to more successful groups, selective imitation occurs when groups imitate the norms, institutions or behaviours of more successful groups, and intergroup competition occurs where groups compete for resources, with some going extinct. All three processes may occur without the diminishment of individuals in the population: even in an intergroup competition scenario, when a group goes extinct, its members may be assimilated into the more successful group, adopting their norms and behaviours.

Therefore, we can see extinction events occurring at higher levels without diminishment of the size of the population at lower levels. Although individual-level biological reproduction is still occurring and physically maintaining group size, this need not impact the dynamics of group reproduction. In the cultural case, we can imagine no selection occurring at the individual-level: all the variants in question could be group-level traits, such as hierarchical structures, systems of centralisation, or other group-level institutions. Here, individual-level reproduction only functions to maintain the existence of the group (at a size at which these group-level traits can be expressed).

Of course, if we saw group extinction occur to the point where we were left with one large group, there would be no more capacity for competition between groups. However, we can imagine cases where the number of groups stays constant (there are extinction of norms, behaviours, or traits, but the number of distinct groups does not itself change).

This can be made clearer with use of a hypothetical example: in this scenario a population is made up of several groups, that never split or bud (so never produce daughter groups), and never go extinct (whole groups are not dismantled or assimilated, even remaining spatially distinct). Instead, in order to measure evolutionary change, we observe the groups at progressive time slices. A process such as selective imitation could lead to changes in the distribution of variants in the population of groups: we could observe a new adaptive variant (such as a new institutional norm) arising in one group and spreading over time throughout the population of groups. For example, this spread could be due to influential individuals in other groups observing the increased success of another group in the population, and adopting its institutional norms, that all group members abide by. Eventually, the norm could reach fixation in the population, where all, or most, groups, have adopted this adaptive norm. The process then repeats itself, as new adaptive variants arise that build on the current institutional norms. These changes would be preserved as long as the groups endured, without any clear generations or production of new entities. This is potentially somewhat similar to what Richerson and Boyd envision in their Nuer and Dinka example: in that case, there are two distinct ethnolinguistic ‘groups’ (in fact consisting of many smaller social/political groupings, but able to be divided into one of the two), which do not split or bud, only persist.

5.3 How Multiplication Affects the Production of Novelty

This connects with the second aspect of multiplication: how it relates to the production of novelty. Bourrat (2014) argues there is no fundamental qualitative distinction between a population of survivors (i.e., a population that does not reproduce), and paradigmatically reproducing populations, in terms of the production of novelty that leads to genuine adaptations. In a population of survivors, all the ‘novelty’ has to be present at the start, with no further opportunity for novelty to arise. In contrast, in a population of reproducers, novelty can be introduced with each generation. Bourrat characterises this distinction as probabilistic: in a population of survivors the probability of successive ‘lucky’ mutations occurring is so low as to be nearly impossible.

This is the case in genetic evolution, where completely novel heritable variants can only arise in the next generation: changes within the lifetime of an individual are (often) not preserved across generations and therefore not available to the cumulative, transgenerational action of selection. In these cases, the connection between multiplication and the production of novelty seems compelling. The production of multiple offspring in the biological case provides more

‘independent platforms’ (i.e. opportunities for novel variants to arise), thereby increasing the potential for cumulative selection (Godfrey-Smith, 2012, 2166).

It would be a mistake to generalise this relationship: the same is not true for culture. Humans are creative, adaptive agents: we are continuously creating, shaping, and modifying our cultural environment. This means that cultural systems have a plastic reconfigurability that differs importantly from biological systems. Taking the scenario outlined previously, where we have a population of groups that do not multiply, it is still possible to envision the constant production of variation. For example, individuals within groups can introduce changes to group norms or behaviours that persist, and therefore can be acted upon by selection. Factors such as the top-down structure of a group (the ability for a small number of individuals to alter group norms), or the general willingness of group members to adopt new norms or behaviours, would appear to be far more important than multiplication in determining the likelihood of novel adaptive variants arising. Here there will still be multiplication of variants. However, crucially, there will not be multiplication of groups (the units of selection).

The ways in which novelty is generated in cultural systems will be discussed in more detail in the following section. However, here, I will discuss one possible response: that in cases of cultural groups a mistake is being made regarding the level of selection. The criticism may go as follows: reproduction is happening at lower levels. This could be (biological) reproduction of group members or reproduction of ideas, norms or behaviours, as they are transmitted between group members. This is the level at which selection is occurring, and reproduction at this level is what allows for cumulative adaptive evolution, that then has knock-on effects on the composition of groups in the meta-population. Therefore, we would be mistaken in dismissing reproduction as a necessary component for such cumulative change. However, I would emphasise in the hypothetical cases described above selection is occurring on *group-level traits*. These are traits that cannot be decomposed into individual-level traits: for example, a system of centralisation. It is groups that differ in fitness relative to these group-level traits. Selection acts on the group-level trait, with no coherent way to understand that trait in terms of individual-level traits. Although reproduction does go on at lower levels, as cells of multicellular organisms themselves reproduce, it cannot be claimed that this reproduction is a necessary component of cumulative selection *at the group level*.

It therefore seems that multiplication is itself not necessary for cumulative adaptive evolution. It is important here to separate out multiplication (the production of more than one offspring of the same type of the parent, thereby providing an ‘independent platform’

from which novelty can arise), from replenishment of individuals that die in order that the population is not doomed to extinction. If it is the case that production of novelty can be decoupled from multiplication, and there is some way for a population to sustain itself in terms of the number of entities (for example, through persistence), then the two functions that multiplication achieves in biological evolution can be accomplished without multiplication itself.

6. Production of Novelty

So far I have established that material overlap, parent-offspring lineages, and multiplication are typical features of biological reproduction that are not in fact necessary for cumulative adaptive evolution. I have argued that multiplication is not necessary in and of itself, but seems to contribute to adaptive evolution because of the role it plays in the production of novelty. However we have reasons to think that the same connection between multiplication and production of novelty does not hold in domains beyond the biological.

Now, we turn to the production of novelty itself: I argue that production of novelty is the only function of reproduction that is necessary for the generation of adaptations. However, production of novelty can be achieved within a population in the absence of any process resembling reproduction (i.e. the production of a new offspring individual from a defined set of parent individuals). Therefore, reproduction is not necessary for cumulative adaptive evolution.

We can see the importance of the production of novelty clearly in the scenarios of populations of survivors, typically invoked to indicate the necessity of reproduction as a whole to adaptive evolution. In these cases, such as that of the grains of sand, the set of traits in the population are determined from the beginning, and cannot be altered. As selection can only act by eliminating less fit variants (i.e. the less erosion-resistant grains of sand), there is no room for further improvements to the most fit variant present from the start, as there is no mechanism whereby new variants are produced. In particular, there is no mechanism whereby new beneficial variants that build on the traits of the most fit variant are produced.

6.1. Selection and Origin Explanations

The importance of the production of novelty can be further understood using the distinction between ‘origin’ and ‘distribution’ explanations (Neander, 1995; Godfrey-Smith, 2009).

‘Distribution’ explanations are those that explain the distribution of a trait within a population, given the set of variants that are already present, while ‘origin’ explanations can explain how the trait came to be present in the population at all. Weaker or more marginal Darwinian selection tends to only be able to feed into distribution explanations. This is a key limitation, as ‘origin’ explanations are an important part of the power of natural selection to build adaptations. This is because part of an origin explanation involves the role of natural selection in reshaping a population so as to raise the likelihood of a given variant being produced. This is through the cumulative action of past rounds of selection, and is key to the generation of complex adaptive structures.

To return to the grains of sand case, selection on persistence can be part of a distribution explanation, in that it can explain the increase in the proportion of erosion-resistant grains in the population. However, selection on persistence can never be part of an origin explanation for how the erosion-resistance came to exist in the population. Were the grains of sand case to be analogous to cultural groups that lack reproduction, this would pose a severe problem for the explanatory capabilities of cultural group selection. The creative role of selection (i.e. when selection is part of origin explanations) means that there are traits that end up in the population that were not present in the population in the beginning. Furthermore, these traits could only have been produced due to the action of several rounds of selection, building upon previous variants. When we invoke selection as the driver of adaptations, it is this innovative work that is key to the explanation. This becomes especially important in culture, where we are faced with many competing explanations for innovation and cumulative improvement. If the production and spread of novel variants is wholly explainable through individual-level processes (such as creativity and general intelligence), then models of cultural selection have little explanatory power.

However, where those who argue for the need for reproduction are mistaken is in conflating the production of novelty with the production of offspring. In the biological world, it is true that production of novelty is intimately linked to reproduction. This is the case whether novel variants are produced through genetic mutations in germ cells, whose effects are realised when offspring are produced and inherit these mutations, or whether novelty arises during individual’s lifetimes, and is passed on (such as epigenetic changes). This is because of the nature of biological organisms: firstly, because organisms are relatively short-lived, and secondly, because of developmental constraints on the kinds of novelty that can be produced throughout an organism’s lifetime.

Even if novelty occurs within the lifetime of a biological organism, if it is not passed on it will not be available to the action of future selection. Therefore, there is necessarily a limit on the cumulative selection that can occur in biological organisms without reproduction, and that limit is the length of their lifetime. A key difference between the capacity for cumulative adaptive evolution in a population of bacteria that exist for a hundred years and a Galapagos tortoise that lives for a hundred years is the capacity for production of novelty.

Firstly, the production of many new individuals creates more opportunities for novelty to arise, as there is a possibility of mutations occurring at each replication event. Secondly, any novelty that does arise is limited in its effects. This role connects to the emphasis Godfrey-Smith (2009) places on the importance of bottlenecks. Bottlenecks allow for an initially localised mutation to have many downstream effects, and thereby creating opportunities for complete reorganisation and restructuring. A mutation that occurs in a somatic cell of an adult organism such as a tortoise has no such capacity: no mutation in an adult multicellular organism would allow for changes to body plan, for example.

6.2 Production of Novelty outside Biological Organisms

At least in the application of evolutionary theory to culture, there seems to exist a crucial difference between the biological and the cultural domain. In culture, the production of novelty is not necessarily linked to the production of a new individual. Firstly, cultural groups are not limited in their lifespan. For example, the Nuer and Dinka tribes of South Sudan have been said to be in existence as separable and identifiable groups for centuries and persist to the present day. There are many examples beyond this: spatially and culturally separable groups persist, as well as groups that are not spatially delineated, but maintain cultural boundaries and differences and can be individuated, such as religious groups.

Secondly, the developmental constraints present in biological organisms are likely not present in cultural cases, or are present to a lesser extent. We can see this more clearly when considering the difference between cultural groups that do exhibit some form of reproduction, and those that do not. For example, there are populations of human groups where there is a reproduction process, i.e. the group splits or buds when it becomes too large (such as in cases like the Faiwolmin, as previously highlighted, and described by Soltis et al, 1995). We can contrast this to a population of groups that does not exhibit budding, and instead merely persists over time. In this case change in distribution of variants is measured at progressive time slices. It does not seem that groups that split or bud would have more opportunity for

the production of novel variants: we can observe cumulative and widespread changes in norms, behaviours and institutions occurring during the lifetime of a persisting group. It may be that the budding process does create an opportunity for reorganisation or wholesale change, but it does not appear as sharp a distinction as in the biological context.

Additionally, humans are creative, adaptive agents, and novelty can be introduced at any point in the development of a group, including novel variants that have far-reaching, restructuring effects. It may be the case that this is a matter of degree rather than a sharp, qualitative distinction: authors have pointed to buffering mechanisms which act to channel and modulate cultural change, such as mechanisms of generative entrenchment (Wimsatt and Griesemer, 2007). There are also other factors that affect the production of novelty within a group, such as the extent to which institutions have a hierarchical, top-down structure. These kind of factors may affect the capacity for novel variants to effect downstream change, and initiate a cascade of effects (similar to the effects that bottlenecks allow for in biological organisms), and may be more important than the presence or absence of a reproductive process.

Therefore, it seems clear that, although the production of novelty is essential for cumulative adaptive evolution, it can be brought about without reproduction. In particular, we can get the generation of adaptations without reproduction at the level that the adaptation is produced (for example, the group). The necessity of reproduction for the production of novelty in the biological world explains the emphasis on reproduction in the literature on selection. However, building a generalised Darwinism that can be applied to other domains involves abstracting away from the contingent mechanisms of natural selection. This means that, in the case of cultural group selection, the absence of a process resembling reproduction in many cultural cases should not be viewed as a weakness in terms of assessing potential.

7. Conclusion

The lack of a reproduction process in cultural populations has been cited as a problem for Darwinian approaches to culture. As many potential examples of cultural evolution lack any process resembling reproduction (such as supposed paradigm examples of cultural group selection, like the Nuer and Dinka case), if reproduction is not necessary for cumulative selection then this has major implications for the scope and plausibility of cultural evolution.

Not only does clarifying the importance of reproduction for adaptive evolution have implications for cultural evolution, but also, considering cases of cultural evolution, reciprocally, sheds light on the role of reproduction. Considering features of cultural populations allows us to examine whether features of reproduction found in biological organisms are intrinsically tied to the production of new individuals, or are separable and can be instantiated without reproduction.

Of the evolutionarily relevant functions of reproduction identified in the literature, the only necessary component is the production of novelty, which can be achieved at least in principle without production of new separate entities.

The main argument for the importance of material overlap rests on its ability to ensure reliability of transmission of variation, particularly in the context of an unstable external environment (Griesemer, 2000). However, ‘scaffolding’ processes can get around the necessity of material overlap, either because cumulative evolution can occur in populations that ‘piggyback’ their transmission on systems themselves built by material overlap (such as in cases of ‘formal reproduction’ by prions or retroviruses), or because there are types of ‘scaffolding’ that can bring about reliable transmission without material overlap (such as cultural institutions).

The second feature, parent-offspring lineages, have been assumed necessary for cumulative evolution and a particular obstacle for many kinds of cultural evolution (e.g., Godfrey-Smith, 2009). However, I build on Charbonneau’s (2014) argument, using an example of diffuse cultural acquisition of traits to argue that what really matters is the preservation of the distribution of variation in the population from one round of selection to the next. Although parent-offspring lineages typically act to ensure this, the cultural case illustrates how we can get preservation of distribution without them.

Thirdly, I separate out two functions of multiplication: to prevent the extinction of the population through the winnowing action of selection, and to provide more opportunities for the production of novelty. However, both these functions can be achieved without multiplication itself. Considering evolution in cultural groups illustrates the possibility of cumulative evolution in a population of groups whose number remains constant over time, but variants themselves spread and go extinct, and where the production of novelty is divorced from multiplication. Individuals within groups can introduce changes to group norms or behaviours that persist, and are acted upon by selection. Factors such as the top-

down structure of a group, or the general willingness of group members to adopt new norms or behaviours, can be far more important than multiplication in determining the likelihood of novel adaptive variants arising.

The production of novelty in itself is needed for cumulative adaptive evolution, as well as the subsequent preservation of the novel adaptive variants that arise. However, these features can be achieved in populations without reproduction. This can be seen clearly when considering how novelty is produced in cultural groups, where group reproduction has little effect on how novel adaptive variants arise or their preservation over time.

The case of reproduction indicates that cultural systems can differ from biological systems in significant respects, while still being capable of undergoing cumulative adaptive evolution.

However, this does not mean that cultural selection will necessarily be an effective explanatory tool at explaining cases of cultural change. In the following chapter, I address these explanatory concerns directly, drawing attention to the ways in which cultural selection has been applied without yielding meaningful explanatory gains.

Chapter 2

What Can Cultural Selection Explain?

1. Introduction

I have argued in the previous chapter that cultural systems do not have to closely resemble biological systems in order for cumulative selection to take place in principle. I have highlighted the capacity for cultural populations to undergo cumulative cultural selection without reproduction, a feature which has been often seen as critical for cumulative selection in biological systems. However, the capacity for cultural selection to act in principle does not mean it is meaningfully explanatory in practice. In assessing the merits of using cultural

selection frameworks or models, it is important not just to show that cultural systems possess features necessary to undergo cumulative adaptive evolution, but also to identify the unique explanatory payoffs that cultural selection can give us, over and above alternative frameworks. Despite claims by some cultural evolutionists that progress in the social sciences has been painfully slow (Mesoudi et al, 2006), it is undeniable that there already exists a very substantial body of work in disciplines, such as anthropology, sociology, and history, that study cultural phenomena and cultural change, using their own frameworks and methodologies, and with their own explanatory goals. To some extent, given the range of work already in existence, the challenge for advocates of cultural selection is to show that there are significant aspects of culture still lacking explanation, that these lack explanation due to the shortcomings of other frameworks, and that an evolutionary approach can make meaningful contributions to our understanding of these phenomena.

To that end, some authors have explicitly proposed a set of cultural phenomena which they argue are under-explained by historical, anthropological, or sociological frameworks, and for which cultural selection will bring particular explanatory value (e.g., Henrich, 2015). This set of phenomena are those which are adaptive (in that the associated behaviours, institutions, norms, or practices are beneficial for an individual or a group), and yet individuals are not aware of why they are adaptive, and they appear not to have been designed by particular individuals. In these cases, accounts which centre around the role of human agency will struggle to explain the adaptiveness of the phenomena. This mirrors one key explanatory target of natural selection in the biological world: the appearance of design without a designer. Unlike in biology, in the cultural domain we are surrounded by designers. What sets cultural selection explanations aside from alternative approaches to understanding culture, in part, is the de-emphasis on human intelligence. In cultural selection explanations, the reason for the spread of a beneficial variant is a ‘blind’ selective process, rather than conscious adoption due to its perceived benefits. Cultural selection explanations could therefore be most likely to offer distinctive explanatory payoffs in these cases where explanations in terms of agency or decision-making fail.

However, not all applications of cultural selection have been so clear in their identification of explanatory targets and unique explanatory payoffs. For example, some authors have suggested applying models of cultural group selection to the behaviour of competing firms (Richerson et al, 2016), without offering a clear motivation for why these models are

preferable to, or offer anything over and above, the range of economic models that have been developed to explain the same behaviour.

It can be easy to apply a ‘selection gloss’ to a wide range of accounts of cultural change, if all that it means to do so is to show how the phenomenon in question could plausibly fulfil the Lewontin conditions. A vast range of cultural phenomena can be described in this way. Mesoudi et al provide an unintentional demonstration of this in their 2004 paper, which they construct to mirror the structure of *The Origin of Species*. They bring in the example of the neotenisation of teddy bears, where over time the features of teddy bears have become more baby-like, due to ‘selection pressure’ from consumers. This is an example of an informal selection description, in which it is unclear what the intended explanatory benefit is of this redescription. If we take away the selection terminology, instead describing this process perhaps in terms of the preferences of consumers, we are still left with the same understanding of the cultural change that has occurred.

We see a similar issue arising in the application of cultural selection frameworks to fields such as innovation and sustainability science. Lewens (2002) argues that in the case of evolutionary theories of technological change, they typically offer no additional insights that could not be gained from traditional models that explain change in terms of, for example, market forces or social forces. In this chapter I consider a case study of the application of cultural selection to sustainability science, arguing that this body of research demonstrates many ways in which selection models are utilised whilst bringing little or no explanatory value. Understanding the ways in which these selection explanations fail can help us to understand how to usefully apply selection frameworks, in order to bring genuinely novel insights.

Furthermore, this question becomes particularly important when considering the practical benefits that cultural selection frameworks are sometimes touted to bring. It has been suggested that applying cultural selection models could be impactful in fields such as sustainability science and innovation. In fact, some authors have asserted that evolutionary principles should be at the centre of redesigning worldviews, institutions, and technologies (Beddow et al, 2009). If cultural selection is going to be able to bring these meaningful practical benefits in terms of addressing urgent global challenges, it must be clear what the explanatory value of cultural selection frameworks is.

In this chapter I aim to clarify the role cultural selection plays in offering explanations of cultural change. In the following section I delineate why we should expect cultural selection to provide explanations of adaptive fit of cultural traits with environment, where explanations involving intention or agency fail. In Section 3 I consider the case of the application of cultural selection to sustainability science, in order to demonstrate how selection frameworks can be applied to cultural phenomena yet yield little explanatory benefit. In Section 4 I consider and resolve two possible objections to my argument, and in Section 5 I suggest considerations that would increase the likelihood of cultural selection offering genuinely novel insights.

2. What Should we Expect Cultural Selection to Explain?

Darwin's theory of evolution by natural selection has been phenomenally successful in providing a unifying framework, bringing together insights from a wide range of disciplines (physiology, development, and taxonomy, amongst others), and transforming our understanding of the biological world. Given this success, it is therefore tempting to attempt to expand the application of Darwin's theory to domains outside of biology, in the hope of similar explanatory gains. In fact, this is the explicit motivation given by some cultural evolution theorists (Mesoudi et al, 2006) for the cultural evolution project as a whole. For these authors, the promise of the application of Darwinian theory to culture is the creation of a 'cultural synthesis' that mirrors what has been achieved in biology, with what they see as disparate and poorly understood cultural phenomena becoming unified under a broad evolutionary approach.

In the previous chapter I have argued that cultural systems differ importantly from biological systems, and that these differences mean that cultural systems may be able to instantiate the necessary characteristics for cumulative adaptive selection whilst lacking processes we take to be critically important in biological systems. In particular, reproduction in biological systems allows for multiplication and the production of novelty, both of which can be found in cultural systems lacking anything resembling a reproductive process. This is an indication that the conditions necessary for cumulative selection in the biological domain do not need to be met in the cultural domain in order for cumulative selection to occur. However, although cultural phenomena may meet the conditions necessary to undergo adaptive evolution, this

does not mean that there are in fact explanatory benefits to applying a selection framework in these cases.

The cultural selection literature often focuses in on the question of whether it is possible to apply a selection model. For example, authors place emphasis on whether aspects of a given phenomena can be said to fulfil the Lewontin conditions (e.g., Richerson et al, 2016), or develop formal models that demonstrate that cultural selection mechanisms could in principle drive the spread of adaptive variants (e.g., Boyd and Richerson, 2009). However, the fact that a selection description is often possible does not mean that the selection description itself offers any explanatory benefit. If cultural selection models or thinking cannot offer new insights, then even though the application of selection models is possible, it does not seem apt or fruitful. Despite the importance of pinpointing the explanatory payoffs of cultural selection, direct engagement with this issue is often neglected within work on cultural selection. As will be demonstrated in the next section through close examination of the case of cultural selection in sustainability science, the application of cultural selection to particular phenomena has been carried out without explicit attention to the explanatory benefits of the cultural selection approach in comparison to existing explanations of the same phenomena.

For biological organisms, there are clear explanatory benefits to invoking natural selection. Darwin's theory of evolution by natural selection provided a naturalistic explanation for the phenomenon of organisms appearing adapted to their environment, with a range of ingenious solutions to problems of survival (i.e., the appearance of design without the existence of a designer). One key aspect of the explanatory power of natural selection lies in its capacity to explain how features of organisms that appear designed to deal with specific challenges posed by their environment came about, without invoking intelligence or purpose within that explanation. Natural selection does have other explanatory roles, including explaining the maintenance of polymorphism within a population, for example. Additionally, there have been debates over the precise explanatory payoffs of natural selection, such as whether natural selection can explain why an individual organism has the trait that it does, or whether it can merely explain the distribution of traits within a population (Sober, 1984, 1995; Neander, 1988). Whilst acknowledging the various roles that natural selection can play, what is clear is that it factors crucially into explanations of adaptive fit in some way.

We should expect cultural selection frameworks to be able to do the same, explaining adaptive fit between cultural variants and environment without invoking intention or agency.

Although selection plays other explanatory roles in biological systems, one distinctive role is that which it plays in explaining adaptation. Additionally, this is the role that has been highlighted in the cultural selection literature: cultural selection proponents often point to the capacity for cultural selection to explain ‘cultural adaptations’ (Richerson and Boyd, 2005; Henrich and Henrich, 2010). Therefore, assessing the explanatory power of cultural selection relies crucially upon the extent to which it can explain adaptation. It may be the case that cultural selection could also explain other characteristics of populations, although this possibility has not been deeply explored in the literature. In the case I will analyse in the following section, it is clear that cultural selection does not offer any explanatory benefits over historical or anthropological accounts. Additionally, many of these same criticisms will hold regardless of your perspective on the explanatory payoffs of natural selection in general: whether cultural selection frameworks should aim to primarily explain adaptive fit or something else, they should be able to offer additional explanatory insights over and above other frameworks (those which explain phenomena primarily in terms of intention, agency, or goal-directness).

This capacity for cultural selection to explain phenomena or aspects of phenomena un- or under-explained by (for example) anthropological, historical, or sociological accounts is crucial. If cultural selection does not provide novel explanations for previously neglected cultural phenomena or aspects of cultural phenomena, or provide a better explanation for these aspects than the alternative accounts, then the argument for invoking cultural selection in these cases is weak. For example, if simple goal-directed agent models could explain given cultural phenomena just as well, then employing the additional tools of selection will not bring epistemic or practical dividends. Goal-directed explanations are widespread in cultural systems; unlike in the biological case, we see many ‘designers’. Humans are intelligent, goal-directed agents who are able to design or modify tools, artefacts, and behaviours to suit their particular purposes. Furthermore, we often are able to successfully explain aspects of cultural phenomena in terms of this goal-directedness. If cultural selection does not fare any better than either naive goal-directed or rational agent models, or than anthropological or historical work on certain phenomena, then it is at best unclear why we should bother developing cultural selection models for these cases.

I focus here on the explanatory payoffs from characterising cultural phenomena as ‘adaptations’ in the evolutionary sense. I will argue in this chapter that we should expect cultural selection to yield genuine explanatory gains in cases where explanations of adaptive

phenomena in terms of intention and agency fail. A lack of explicit attention to the payoffs of cultural selection over and above alternative frameworks has led to the development of cultural selection approaches in cases which yield little epistemic or practical benefit.

However, there are two potential responses to this claim. Firstly, one could argue that there are other key explanatory payoffs other than the explanation of adaptation without intention: for example, unintuitive or unexpected conclusions that result from taking a ‘population thinking’ perspective. Secondly, one could argue that expecting ‘distinctive explanatory payoffs’ from cultural selection is too demanding a criterion, and cultural selection frameworks can still have value even if they do not provide novel explanations.

The potential for ‘population thinking’ to generate novel insights could provide a motivation for applying cultural selection models to particular phenomena, even if successful historical, social scientific, or anthropological explanations exist for these phenomena. In contrast to, for example, ethnographic work, which attends to the particulars of individual experiences, a ‘population thinking’ approach abstracts away from individuals and instead analyses the population-level consequences of the interactions of individuals with particular dispositions. Elliott Sober (1991, 492), in his analysis of the models of cultural evolution found in Cavalli-Sforza and Feldman (1981) and Boyd and Richerson (1985), suggests that the usefulness of these models to the “day-to-day research of social scientists” depends on how good social scientists are at “intuitive population thinking”. Sober argues that social scientists are often primarily interested in the sources of particular ideas or norms, whilst cultural evolutionists are typically interested in the transmission patterns of these norms. However, social scientists do make qualitative assumptions about the transmission systems at work, and Sober claims that the cultural selection approach would impact social science work to the extent to which cultural selection models undermine these qualitative assumptions. Boyd and Richerson’s (2005, 97) response, as highlighted by Lewens (2018), emphasises that we are not all good intuitive population thinkers. Therefore, we would expect the adoption of the ‘population thinking’ perspective to generate unexpected insights, that we would not have arrived at without this approach, motivating the development of cultural selection frameworks.

However, it is possible to accept the value of ‘population thinking’ without adopting cultural selection as an explanation for cultural phenomena. Lewens (2010, 2015) suggests that we can distinguish ‘population thinking’ (or kinetic theories of culture) from selection-based approaches. For example, a ‘population thinking’ approach could consider the population-level consequences that arise from a group of individuals with a particular social learning

bias, such as the predisposition to adopt the most common cultural variant within their group (conformist bias). This may result in interesting and unintuitive results, such as the reduced ability for new cultural variants to spread throughout a group. However, we can understand this without invoking selection machinery here. This separation is clearly evident when considering the work of those in the ‘cultural attractor’ school of cultural evolution, such as Dan Sperber and Nicolas Claidière. These authors are often critical of cultural selection approaches (Sperber and Claidière, 2006), and yet their own work is dependent upon ‘population thinking’, where this means understanding a cultural system as a “population of relatively autonomous items of different types with the frequency of types changing over time” (Claidière et al, 2014). Therefore, we need explicit motivation for applying cultural selection in particular, rather than adopting a general ‘population thinking’ perspective.

Whilst Lewens (2010, 834) claims that it is ‘population thinking’ that is the “explanatory centrepiece” of cultural evolution work⁶, rather than cultural selection, there are many cases in which cultural evolutionists seek to explain cultural phenomena in terms of selection and characterise these phenomena as adaptations. One prominent example of this is cultural group selection, which has been proposed as an explanation for the widespread cooperative tendencies found in human societies (which will be addressed in detail in the following chapter). Additionally, cultural selection frameworks are being applied within innovation and sustainability science, with the hope of generating practical benefits. Therefore, the project of clearly identifying the explanatory payoffs of cultural selection in particular, rather than ‘population thinking’ more generally, is significant. I will make the case in this chapter that cultural selection models have been applied in ways that offer no explanatory benefit, and in fact can confuse or obscure our understanding of particular phenomena. This is compatible with the possibility that a ‘population thinking’ approach could have value in these cases, although I will not suggest what this might look like or argue for this claim.

Secondly, my claim that cultural selection should offer distinctive explanatory benefits does not necessarily entail that there must be cultural phenomena that cannot possibly be explained in any other way; this would be far too demanding. We can see debates over a somewhat parallel claim in the ‘extended evolutionary synthesis’ literature. For example,

⁶ Richerson and Boyd do this themselves, claiming that “population thinking is the core of the theory of culture we defend” (2005, 5). However, several of the core cases in this book invoke cultural selection, such as that of the Nuer and the Dinka (discussed in detail in Chapter 3 of this thesis).

some authors have argued for the value of niche construction as a framework for understanding biological phenomena. This is not because it is *impossible* to explain particular biological phenomena without invoking niche construction as a separate evolutionary process: indeed, opponents of the ‘extended evolutionary synthesis’ point out the capacity for standard approaches to explain the targets of niche construction (Scott-Phillips et al, 2014). However, its proponents maintain that recognition of niche construction as a distinct process could lead to attending to phenomena that were not attended to previously, and developing explanations for these. Additionally, this approach could generate further insights into phenomena that were under-explained by a standard approach (Laland and Sterelny, 2006; Uller and Helanterä, 2017). This response can be decomposed into two claims about the value of the niche construction framework. Firstly, niche construction can be said to have distinct heuristic value: it sets an agenda for research, directing researchers’ attention towards particular phenomena that were previously neglected. Secondly, thinking about certain phenomena in terms of niche construction may add new dimensions to our understanding, even if explanations can be formulated in terms of the standard approach.

Similarly, in the case of cultural selection, one could argue that it has heuristic value. In Section 4 I will directly address this claim. I suggest that this is possible, and would be some justification for adopting a cultural selection approach, although I argue that a convincing case for its heuristic value has not been made thus far.

Additionally, one could argue that cultural selection offers better explanations, works at a different level of explanation, or explains aspects of a phenomena that were previously under-explained. This could be the case even if alternative frameworks can provide explanations for a given phenomena, and would be an argument for the value of cultural selection approaches in these cases. However, as will be shown using the case study of sustainability science in the following section, cultural selection frameworks have been applied in ways that heavily rely on anthropological or historical accounts to provide explanatory power, whilst not adding anything by the use of selection terminology. In these cases, alternative frameworks were already explaining certain phenomena, and cultural selection models are relying on the explanatory power of these frameworks, whilst not generating anything new.

3. The Pitfalls of Applying Selection Explanations: The Case of Sustainability Science

In this section I outline the potential dangers, or pitfalls, of applying selection explanations in a way that does not provide any additional explanatory gains. I identify cases in the literature where a ‘selection gloss’ has been applied to a description of phenomena, with little or no epistemic payoff, and suggest that this is a pervasive problem within work on cultural selection. This is particularly problematic in areas where cultural selection frameworks are intended to have practical applications: the practical benefits of cultural selection as a research programme cannot be realised without a rigorous evaluation of when and how selection explanations should be applied to yield genuine explanatory benefits.

We see precisely how selection-based explanations can fail when focusing in on a specific domain: the application of cultural selection frameworks to sustainability science. Sustainability science is a discipline which deals with interactions between natural and social systems, and how these interactions affect sustainability (Kates et al, 2001). The goal of the discipline is broadly to find solutions to challenges around sustainability, in order to ensure the wellbeing of future generations of humans and animals. A 2018 special issue of the journal *Sustainability Science* was titled “Applying Cultural Evolution to Sustainability Challenges”. Their motivation behind applying cultural evolution models to sustainability science, and cultural multilevel selection models in particular, is to use these models as a tool for better understanding the dynamics of cultural change. This, then, could in principle help us to understand the aspects of institutions that contribute or work against sustainability, and to target interventions more effectively. If cultural selection frameworks could yield the explanatory insights that the journal editors and authors claim, then it could indeed be a very useful practical tool in addressing an urgent global challenge. However, I suggest that the much of the work thus far does not in fact bring the explanatory gains that have been promised, and gives us reason to be pessimistic about the usefulness of cultural selection in the case of sustainability science. This case should motivate general caution about the application of cultural selection in fields where there are competing frameworks which explain the phenomena under study, and the distinctive explanatory promise of cultural selection has not been identified.

3.1 Consider the Lobster: Cultural Selection in Lobstering in Maine

One example of such work is the application of cultural selection to the historical changes in institutions and behaviour surrounding lobstering in Maine. Waring and Acheson (2018) argue that cultural group selection has shaped the institutions and behaviours surrounding

this industry and its regulators. They offer a detailed account of the way the industry operates, and the changes that have occurred over the past century, which they reinterpret in the light of cultural evolution. Their aim is to explain ‘institutional fit’: the adaptive fit between the institutions associated with the lobstering industry and the environment. They appear to focus on cultural selection at the level of the group due to their interest in explaining group-level characteristics (such as conservation laws), which are group-beneficial.

According to Waring and Acheson, cultural group selection requires only two necessary factors: various group cultural states, and for those states to spread between groups differentially. They define ‘group cultural state’ as either an institution or a group-level aspect of individual behaviour.⁷ As set out by Waring and Acheson, lobstering in Maine is carried out by relatively small groups of lobster-fishers, or ‘harbour gangs’, consisting of between eight and fifty boats. Harbour gangs have defined territories where only gang members are allowed to trap lobsters, which they defend. Waring and Acheson focus on two aspects of the lobstering system: territoriality and conservation. As described by the authors, harbour gangs are cohesive social units, and territorial institutions and behaviour vary between groups. Some of these behaviours are cooperative. They argue that, despite the lack of direct evidence for strategic imitation, social learning, or other mechanisms of spread, that we can reliably assume that these kinds of mechanisms have been at play. They draw the conclusion that the informal territorial system maintained by harbour gangs has the necessary factors for cultural group selection, and there are many institutions and behaviours that should be considered group cultural adaptations. In terms of conservation, they discuss the passage of several laws and regulations, redescribing historical changes in terms of selection at various levels.

Superficially, Waring and Acheson build a plausible case. They set out necessary conditions for cultural group selection to take place, and aim to demonstrate that harbour gangs often fulfil those necessary conditions. However, if we consider the ways in which they describe putative cases of cultural group selection more closely, it becomes less clear what explanatory benefits we gain from their cultural selection framework.

⁷ It is unclear here what they mean by a ‘group-level aspect’, as this could potentially include almost every cultural trait. For example, a trait we would intuitively consider as an individual trait (such as hair length), could be considered to have a group-level component in that each individual trait value contributes to the group average.

The lack of explanatory power can be understood when seen in comparison to a purely historical or agent-based account. Here, I consider one of their examples in detail: the double gauge law. This is a law that set a maximum and minimum size for saleable lobsters, thereby protecting juveniles and large reproductive-size lobsters from being caught. According to Waring and Acheson, this is an example of a ‘social dilemma’. Individuals (and harbour gangs) who take all sizes of lobsters will benefit through increased catches and therefore increased individual profits. However, restrictions on maximum and minimum size benefit the group as a whole (the population of lobsterers in Maine), as they protect the reproduction of the lobster population, and therefore prevent a ‘tragedy of the commons’ from taking place.

Waring and Acheson describe the passage of double gauge laws as follows: a law of this kind was initially proposed in 1905, but what they term ‘between group differences’ caused by varying ecological and economic environments prevented its passage. Then, during the 1920s and 1930s the lobster industry in Maine experienced a significant decline in catches, and competition from the Canadian lobster industry, which led to a third of lobster-fishers leaving the industry. Waring and Acheson describe this as a type of ‘cultural natural selection’, although they do not explicitly lay out why this constitutes a selective process. According to their narrative, these crises contributed to the passage of the double gauge law in 1933. Its passage was aided by the work of prominent actors, such as the Commissioner of Sea and Shore Fisheries, who spread support amongst lobstermen and legislators. Waring and Acheson describe the passage of this law as a “state-level collective-action adaptation to a difficult social dilemma” (27). According to the authors, selection at the individual level and at the state level were in conflict, and this was the reason for the political deadlock, until a major state-wide crisis allowed the law to pass, which they term “strong group-level selection” (ibid).

Taking Waring and Acheson’s description of the historical changes as accurate, we can construct an alternative account that captures these changes, without the selection machinery. One possible alternative account would understand this case in terms of individual or group agency, i.e. rational decision-making on the part of individual actors, perhaps supplemented by an account of social power dynamics, in which certain individuals are particularly influential. Under this agent-based account, the law did not pass when it was first proposed due to the varying interests of those who would have to support the law in order to ensure its passage: many lobster fishermen and political actors representing their interests regarded the laws as simply limiting the profits they could make, and thereby

harming the industry. The crisis in the 1920s and 1930s led to individuals changing their attitudes, as they realised that such conservation laws were necessary for the survival of their industry.

Acheson himself, in previous work, characterises the passage of the law in this way. In an editorial piece for *Anthropology News*, he describes the attitudes of many lobster fishermen before the industry crisis as being happy to flout existing conservation rules, with many believing that breaking these rules would have little effect on the sustainability of the resource and therefore their livelihood. The extent of the crisis the industry subsequently faced had a causal role in changing these individual attitudes, meaning that lobster fishermen became increasingly convinced that conservation laws such as the double gauge law were critical for the survival of lobstering in Maine (Acheson, 2010). We can also include the role of powerful actors in such an account: Acheson (1997) describes Horatio Crie, the then Commissioner of Sea and Shore Fisheries, as rejecting a law that would have reduced the minimum size further, in the belief that this would cause the demise of the lobster population. He supported a double gauge law, seeing it as a political compromise and necessary for the longevity of the lobster industry. Although politicians in the Maine legislature were divided over this issue, with the help of a forceful speech given by Crie in support of the law, the law passed. Such an account explains cultural phenomena through the decision-making of individual agents. A historical account such as this can still accommodate institutional structures and cultural norms that constrain the decisions that individuals make.

When we compare Waring and Acheson's selection-based account to such an historical account, we can see the superficiality of the application of the cultural selection apparatus. The historical account I have laid out is virtually identical in structure to the description given in the Waring and Acheson paper, without the post-hoc addition of selection terms. The detailed historical account provided by Acheson himself locates the explanation for the changes in, for example, the 'bust' in the industry that caused a realisation that measures were needed to ensure its longevity. In contrast, Waring and Acheson characterise the passage of the law as a 'state-level adaptation'. By adaptation, they invoke the concept of cultural selection at the state-level, which supposedly 'overrides' selection at the individual level.

In this case, we could question both whether there is any kind of selection going on here, and whether selection is meaningfully explanatory. For example, it is unclear in what way the passage of the double gauge law resembles a selective process: there is arguably no

competition and no clear mechanism of spread. However, even if we accept that we could apply a selection model to this case, we do not find a reason to do so: it does not offer any additional explanatory power. If we mean, minimally, that this law was a result of group selection as it provided group benefits, then, by extension, we could describe a large proportion of all laws passed as ‘state-level adaptations’. However, this does not provide any additional insight in to the processes that drove the passage of the law, or the effects of the law on the system.

3.2 Applying a ‘Selection Gloss’ to Cultural Phenomena

We can see the case of the double gauge law, and the other examples given in the Waring and Acheson paper, as applying a ‘selection gloss’ to cultural phenomena. They introduce selection-based terms in order to describe the various institutional changes in territoriality and conservation, however, this application is entirely superficial. In the case of the passage of conservation laws governing lobster fishing in Maine, the application of cultural selection does little to no explanatory work. Rather, the explanatory power stems from the historical descriptions Waring and Acheson provide. In the case of the double gauge law, it is the identification of specific, historical causal factors that are doing the explanatory work.

Additionally, it is unclear what practical benefits we could possibly obtain from applying such a selection gloss. If using selection-based terminology does not give us additional explanatory benefits over and above historical, sociological, or anthropological explanations, then it cannot usefully guide the implementation of policy interventions. Waring and Acheson do not spell out concrete ways in which their analysis could drive the design of particular interventions, although they suggest that the ability to make a prediction of the level at which adaptation in lobstering practice will be ‘most robust’ could be potentially useful in policymaking. However, it is difficult to see how determining the ‘level of adaptation’ here could have such a use, given that it is entirely unclear what it means for a phenomenon to constitute an adaptation in their analysis, except in the most minimal sense of being beneficial to individuals, groups, or the state. It seems that determining the ‘robustness’ of a ‘level of adaptation’ would involve a detailed analysis of institutional structures, and the interests of relevant stakeholders. This has been previously identified as a key problem in sustainability science (Gupta, 2007), and using cultural selection does not provide us any way to address this problem. Once such a detailed analysis is carried out, it is unclear what

additional benefit there would be to characterising it as an adaptation, and redescribing it in selection terms.

The case of the double gauge law illustrates problems with their approach more broadly. Firstly, Waring and Acheson only consider cultural selection-type explanations for the phenomena they discuss. In cases where they do not see evidence for cultural group selection, they instead conclude that individual selection has taken place, rather than then considering non-selection-based explanations. Although it may be possible to describe these cases in terms of either group or individual cultural selection, they do not make any effort to show that this provides any benefit over alternative explanations, and that therefore there are any pragmatic payoffs to this approach.

One example of this is in their discussion of the passing of a law that banned the collection and sale of lobsters with a v-shaped notch in their tail flipper, which is a way of marking egged females. Effectively banning the harvesting of egged females increases the chances that the lobster population will have long-term sustainability. They describe creating the mark as a ‘low cost individual action’, which became a widely held informal conservation norm. In the words of Waring and Acheson, “individual selection for the practice appears to have been sufficiently positive to support its adoption without state-level selection” (27)⁸. Underlying this conclusion is the uninterrogated assumption that selection-based explanations are automatically appropriate. They do not attempt to argue that we should specifically adopt an individual selection explanation over, for example, a historical explanation. These explanations would look very similar in structure, as with the double gauge law case, as it is unclear what work the selection terminology is doing. An explanation focused around individual decision-making might, for example, understand the widespread adoption of the v-notch custom in terms of the reasoning process of individual lobster fishers, who make the decision to carry this out because it is an easy action, they see the benefits to their community, and the benefits ultimately to themselves from maintaining the lobster population.

⁸ It is unclear what they mean here by “individual selection”, when marking egged females appears to be group-beneficial and individually costly (as individuals who catch all lobsters, including egged females, would presumably increase their profits). It would seem more accurate to characterise this as a case of group selection. However, even if we find a different case, where individual selection could appropriately apply, we would still be confronted with the problem of assuming that selection is going on at some level, rather than questioning the benefit of relying on a selection explanation at all.

Secondly, and relatedly, they maintain a heavy focus on the necessary conditions for cultural group selection, and whether groups in the Maine lobstering case can, minimally, fulfil those conditions. This can be seen clearly in the way they set out the two necessary factors for cultural group selection (the existence of group cultural states and that those states spread differentially between groups). This characterisation is extremely minimal, more so than in other treatments of group selection in either the biological or cultural evolution literature. For example, they do not discuss the possible mechanisms of spread, as in the Richerson et al (2016) treatment of cultural group selection, where they identify three different types of cultural group selection (selective imitation, selective migration, and natural selection). They also do not differentiate between selection on group traits (such as institutions) versus selection on individual traits mediated by group structure. This means that even if ‘group cultural states’ spread through the conscious, intentional adoption of a certain behaviour by individuals, this would fulfil their conditions for a cultural group selection process.

Although it may often be possible to describe a set of phenomena in such a way as to fit a set of conditions or a general model (either in the terms Waring and Acheson set out, or, for example, in terms of the Lewontin conditions), this does not mean that such a description has any explanatory power. In particular, this does not mean that this description is explanatory over and above the insights from alternative frameworks. To use a concrete example, imagine there are two competing firms (although, Waring and Acheson do not specify that these groups need to be in competition, or any factors that might indicate they are part of the same Darwinian population). One firm holds a specific cultural trait (for example, an open office plan). Individuals (perhaps those in positions of power) from the other firm observe this trait, and convene a meeting of the board to decide whether to also adopt an open office plan. Members of the board consider the possible positives and negatives, and ultimately vote to adopt the trait. This example fits the necessary factors Waring and Acheson lay out, but this example demonstrates that a cultural selection explanation would not offer any unique insight or understanding into the causes or processes that drove this behaviour. An analysis of this phenomenon would likely revolve around (for example) power structures in the firm, the costs and benefits involved, and the individual decision-makers. The power that any selection explanation might have would be parasitic on these analyses.

The attention paid to ‘whether we can’ rather than ‘why we should’ is not limited to Waring and Acheson’s approach, or the application of cultural selection to sustainability science. This

is an issue that also applies to the cultural selection literature more broadly. This is a particular problem when it comes to the study of culture, where we are faced with competing frameworks and methodologies that have already build up a substantial body of understanding. In the context of his critique of memetics,⁹ Kuper (2000, 188) argues that “there are already well-established techniques for the study of cultural diffusion, ideological change, and technical innovation. At the very least, new methods should be tested against the old, to demonstrate that they produce better results.” Given this epistemic landscape, the onus is on cultural selection advocates to show not only that selection models can, in principle, describe cultural phenomena, but that they bring us new insights and understanding that we did not already possess.

3.3. Broader Implications

These concerns are not limited to the Maine lobstering case, but extend to wider attempts to applying cultural selection frameworks to sustainability research, and beyond. This becomes particularly pressing when considering the purported practical implications. If selection explanations are supposed to give concrete practical benefits in fields with urgent problems such as sustainability, then it is crucial that applying these frameworks are in fact bringing the novel insights that are being claimed of them.

Waring et al (2015) attempt to sketch out a multi-level selection framework that could be broadly applied to sustainability analysis. Waring et al argue that current multilevel frameworks, such as Elinor Ostrom’s polycentric approach (e.g., Ostrom, 2005), do not contain general mechanisms of causation, or guidance for designing policy in such contexts. In contrast, they argue that a multi-level evolutionary framework does provide such mechanisms of causation, which are necessary to design effective interventions. They identify ‘cooperation dilemmas’, where individual and group interests are misaligned, and so a ‘tragedy of the commons’ situation would occur if individuals were allowed to pursue their interests unrestricted. It certainly seems plausible that these kinds of dilemmas are widespread in the area of sustainability, and that the ability identifying the level of organisation at which an

⁹ Somewhat similar explanatory concerns to those I have argued for here have been raised in the context of memetics, a version of an evolutionary approach to culture which relies on a strong analogy between biological and cultural evolution. The cultural selection models developed by Richerson, Boyd and Henrich, and those applied in the fields of innovation and sustainability science, avoid many conceptual problems that have plagued memetics, such as the problem that memes are not replicators in the way that genes are (Sperber, 2000), and that culture cannot be partitioned into discrete units (Kuper, 2000). However, the need for identification of clear explanatory benefits applies equally to cultural selection frameworks that reject the particular theoretical commitments of memetics.

intervention would be most effective would bring clear practical benefits. If it were the case that cultural selection frameworks could help answer this question, this would indeed be significant. However, we are again faced with cultural selection models that lack explanatory power.

They then outline several cases as examples of how a cultural multi-level selection framework can help us understand the patterns that arise in social-ecological outcomes and how these outcomes are determined, and thereby inform intervention design. In particular, they argue that the cultural selection framework can guide hypothesis generation, leading us to ask certain kinds of important questions, and suggesting avenues for empirical research. However, in all the cases they outline, we see the same issues as in the lobstering case.

For example, they describe littering in the United States, as a case which supposedly demonstrates the importance of examining competitive interactions between government and corporations in determining environmental outcomes. According to their characterisation, littering presents a social dilemma, in that everyone benefits from a reduction in litter, but there is a ‘free rider’ problem in that individuals can avoid the costs of reducing litter, or enforcing bans or regulations, but still benefit from others doing so. As Waring et al describe it, federal and state regulations imposed a ‘selection pressure’ on corporations, who then cooperated to produce a ‘supergroup’ to solve the collective problem (the industrial advocacy group Keep America Beautiful). The lesson Waring et al take from this case is that entities at the ‘same level’ in different domains (i.e., government and corporations), may compete, and this leads to resolving the cooperation dilemma.

As in the lobster fishing case, it is unclear in what way the institutional or legal changes in any way resemble a selective process: although governments and corporations can sometimes compete in some ways, the relationship is complex, multifaceted, dynamic, and radically different from the kind of competition for resources that paradigm Darwinian populations might engage in. For instance, governments and corporations often do not compete for a limited pool of resources, where one succeeds at the expense of the other. The lack of a competitive process that resembles competition in paradigm Darwinian selection need not be a barrier in itself to applying cultural selection in this case: as I have suggested in the previous chapter, cultural systems can vary in significant ways from biological systems and still be capable of undergoing cumulative adaptive evolution. Additionally, there is debate over the role of competition within natural selection in the biological domain, with some

authors arguing that selection can occur in the absence of competition for resources (Doolittle, 2014). However, whilst we may not strictly require competition for selection, the use of selection terminology in the littering case could be confusing, and obscure more than it explains. Waring et al describe the interactions between governments and corporations as competitive, implicitly invoking a sense of competition in the Darwinian sense that does not hold up under scrutiny. It is unclear what explanatory value we gain from describing the interactions between governments and corporations in a loose Darwinian sense. Furthermore, this abstraction, even if possible, may obscure highly relevant features about the nature of the interactions between governments and corporations.

Another example of this within the same case comes from the term ‘selection pressure’, that regulations supposedly place on corporations, where it is unclear how the effect regulation resembles selection pressures as usually understood. It may be ultimately beneficial to avoid importing conceptual baggage that may not be relevant to the case, and, for example, understand regulation in the way that regulation is generally conceived (i.e., that governments use state power to impose negative consequences for certain actions, altering the costs and benefits for a corporation to carry out a given behaviour).

More generally, Waring et al (2015) argue that identifying the ‘dominant level of selection’ can be a crucial tool in designing and evaluating sustainability policy, and that the reason that some intervention strategies are successful is because they alter the level of selection. In some senses the selection perspective seems intuitive in the context of sustainability, in that the literature frequently refers to the ‘adaptive fit’ of solutions to a particular problem or social context, or ‘adaptive capacity’ of institutions (Miller et al, 2011; Berman et al, 2012; Epstein et al, 2015). Cultural selection frameworks take this use of ‘adaptive’ or ‘adaptation’, reinterpreting them as ‘adaptations’ in the evolutionary sense. They no longer simply refer to well-designed solution, or features of an institutions that correspond to environmental or contextual features, but the outcome of specific kind of process (a selective process). We could question the resemblance between selective processes and what appears to be occurring in these sustainability cases. We could relax our understanding of selection to include these cultural cases; however, this comes at the expense of explanatory power.

Although identifying the ‘dominant level of selection’ is stated as a key part of cultural multilevel selection analysis, it is not clear what this would involve. It is unclear what the mechanism of spread may be: typically, these cases don’t involve ‘extinction’ or ‘proliferation’,

and there is little mention or evidence of the mechanisms put forward by cultural group selection advocates (selective migration or imitation). One possibility as to what multilevel cultural selection here might look like is the account of nested selection processes given by Vincenti (1990), in the context of engineering. Vincenti describes a kind of variation-selection process, in which variants of a particular technology are produced (such as retractable landing gear for airplanes). Then, a process of selective retention occurs, where variants which do well in trials are retained and others discarded. This could happen at multiple levels: for example, at the level of the individual engineer, at the level of a company producing the technologies, or at the level of the design community as a whole. Whilst this may seem convincing in the case of technological innovation, it is difficult to identify a similar structure in the case of sustainability science, where there is not a clear process of selective retention.

When discussing interventions, for example, they cite the Marine Stewardship Council certification as an example of a system that changed the ‘dominant level of selection’. However, although third-party certifications can change the incentives for stakeholders and therefore change behaviour, it is unclear in which ways selective processes were altered (if they were ever present). It sometimes appears that by ‘dominant level of selection’ they mean the level at which there is the most trait diversity, although this would not be a useful measure, as it is possible to have a large range of trait diversity with no evidence of anything resembling a selective process. Whether or not it is *possible* to describe these cases in terms of selection, selection does not provide any additional explanatory insights or resources here.

Furthermore, the claim that Waring et al (2015) make that identifying the dominant level of selection will aid intervention is not uncontroversially true, even if we were able to define what we mean by ‘dominant level’ in a given context and show convincingly that a selective process was occurring. Kline et al (2018) identify an ‘implementation gap’, where, despite much hope that evolutionary frameworks can be used to address global sustainability challenges, there are still no guidelines to make cultural evolutionary theory applicable to sustainability research. Perhaps this implementation gap persists because of the lack of explanatory power cultural selection has brought in the way it has been applied thus far.

The cases where cultural selection has been applied to sustainability science, such as the passage of conservation laws, seem to be at least as well described through processes of rational thinking or conscious deliberation, of which all individuals involved would be able to

articulate and reflect on. If selection explanations fail to pick out any unique insights about the passage of such laws, and in the face of large bodies of existing knowledge, including quantitative work in the disciplines of political science and economics, it becomes very difficult to make the case for applying cultural selection in this domain at all.

The case of sustainability science should give us reason to be wary of applying cultural selection frameworks without a clear understanding of what the explanatory gains might be. This is a striking example of explanatory deficits in cultural selection, although it is not an isolated case. We see similar problems with key cases in the wider cultural group selection literature, as will be argued in Chapter 3, and with explanations of phenomena in terms of the broad social learning biases thought to underpin cultural selection, as will be outlined in Chapter 4. In the following section, I defend this pessimistic view of the explanatory power of cultural selection from two objections.

4. Possible Objections

Here I will address two possible objections: firstly, that selection models are operating on a different level of explanation, and therefore the presence of successful intention-based explanations is not a reason to discount the applicability of cultural selection in a given case. Secondly, that cultural selection could still be a useful heuristic, and therefore could productively guide research, even if strictly there are no distinctive explanatory gains.

Additionally, some may argue that the case of the application of cultural selection to sustainability science is uniquely weak, and that this argument is therefore restricted to this case and does not apply to the wider cultural selection literature, or attempts to use cultural selection in other areas. However, as has been noted, some authors have identified similar explanatory deficits in the use of cultural selection in understanding innovation (Lewens, 2002). Furthermore, I will argue in the following chapter that processes of cultural group selection as identified in the main cultural selection literature face similar explanatory challenges.

4.1. Are Selection Models Operating at a Different Level of Explanation?

One might argue that a cultural selection account and (for example) a historical account are operating at different levels, and that therefore the existence of successful historical explanations does not matter for the explanatory power of cultural selection. This objection can be made clearer by considering a biological analogy. Let us take the classic example of Darwin's finches, where Darwin (1859) observed differences in the dimensions of the beaks of finches living on different islands of the Galapagos archipelago. Evolution by natural selection can explain these differences in beak shape through adaptation to the different available food sources: individuals with beak shapes that allowed them to more effectively utilise food resources were selected for, surviving and reproducing more than individuals with less well-adapted beaks.

However, we could also offer an explanation on the level of life histories. We could track the birth and death of each individual finch, and describe in detail, and perhaps with agential terms, how they lived their life and how many offspring each finch had. This would give us the same information as in the selection explanation, as we would have tracked differential survival and offspring production, although without the overarching framework. We could therefore perhaps argue that there is no need to invoke selection here, as a life histories account also provides a successful explanation. However, this would be an odd argument to make in this biological case, when the explanatory power of natural selection seems so clear.¹⁰

To apply this analogy to cultural selection, we could imagine that a historical account of cultural change might trace individual actors in great detail, whereas a cultural selection account would pick out particular types of causal processes. The cultural selection account may rely on the historical account in the sense that individual actions are driving the change, in the same way that a natural selection account relies on the life histories of individual organisms. Here, we might be tempted to think that a cultural selection account would be still be useful and powerfully explanatory, because by abstracting away from details of the lives of particular individuals we can gain some insight into what is driving changes in the population as a whole.

My position is not that cultural selection can *never* be explanatory in this way. We could certainly construct hypothetical cases where cultural selection has the same power to explain adaptation as natural selection does. In these cases it would offer genuine insights over and

¹⁰ Many thanks to Peter Richerson for bringing this objection to my attention.

above the historical account: it would identify particular causal factors driving adaptive fit in the population which are obscured when examining individual lives in detail. However, the cases that have been analysed in the previous sections are not of this kind. In the case of the double gauge law, for example, it is precisely the historical detail of Acheson's account which is driving the explanation, and selection terminology has been glossed on top of it. The selection framework does not pick out any particular factors that were not already identified by the historical account, and therefore does not give us a better understanding of populational change.

Additionally, although the contrasting accounts I have considered in this chapter have been largely historical or anthropological, alternative frameworks include those from the social sciences, such as models used in economics and political science. Economic models often also consider change on a population level, picking out causal processes and abstracting away from the particulars to draw generalised conclusions. If cultural selection is going to be applied to the behaviour of firms, as some authors have suggested, then it must clear why the abstractions and idealisations of cultural selection models are superior to the abstractions and idealisations used in economic models. Given the wealth of economics literature on understanding the dynamics of firms in a market, the onus is on those who want to use cultural selection models to understand these dynamics to show why cultural selection explanations can not just explain these phenomena as well as economic models, but do better in at least some respects.

4.2. Can Selection be a Useful Heuristic?

Another possible objection to my pessimism regarding the application of cultural selection in practice is that cultural selection could nevertheless provide a useful heuristic. One potential benefit of using cultural selection frameworks could be the ability to ask certain kinds of questions. In this way, cultural selection can be seen as a heuristic, intended to generate hypotheses and structure empirical research. It could be argued that selection explanations can pick out a set of relevant causal processes, and thereby draw our attention to a specific set of factors, even though others may also be causally relevant. Cultural selection may therefore sometimes be a useful tool to structure and guide research, through changing the way that we approach phenomena and the kinds of phenomena that are the subjects of study.

Waring et al (2015) do mention this possibility, suggesting kinds of questions that a cultural multilevel selection framework might prompt researchers to ask. However, in the examples discussed in sustainability science, it is unclear how cultural selection produces new useful hypotheses that would not have been produced under alternative frameworks. For example, the task of identifying the ‘dominant level of selection’ that Waring et al describe as a benefit of the cultural selection framework, does not seem meaningfully different from the task of identifying the dominant level at which interventions can be made, that other theories of institutions require.

Northcott and Alexandrova (2015), in their critical examination of the explanatory power of the Prisoners’ Dilemma in the social sciences, consider the possibility that the Prisoners’ Dilemma has heuristic value, even if it has limited explanatory payoffs. They focus on one of the most well-known cases of the application of the Prisoners’ Dilemma to real-world phenomena, Robert Axelrod’s (1984) work on the ‘live-and-let-live’ system of informal truces that arose in World War I trenches. They argue that the reliance on pre-existing historical work shows that Prisoners’ Dilemma-like thinking was already present in our analysis, and therefore did not lead to any causal explanations we did not already possess. We can see a similar issue arising in the work of Waring and Acheson on lobstering in Maine: the reliance on historical or anthropological work to drive the explanations seems to tell against the heuristic value of the cultural selection approach, as cultural selection is not generating any new questions that were not already guiding research into these phenomena.

Additionally, we must be wary of using selection as a heuristic when there are significant disanalogies between the structure of the phenomena in question and a selective process. Although in this chapter I have focused on the lack of explanatory payoffs, rather than the lack of resemblance between the cultural systems under study and populations that are able to undergo cumulative adaptive evolution, this does appear to be a concern in many of the cases of supposed cultural selection in sustainability science. In these cases using selection as a heuristic might in fact lead us astray, unhelpfully distorting our understanding of cultural phenomena.

5. When are Selection Explanations Useful?

I have argued that the way that cultural selection frameworks have been applied in practice has meant that we see little to no explanatory gains from using these frameworks. However, this is not to say that cultural selection could never be explanatorily valuable. Here I suggest two considerations that could lead to useful cultural selection explanations: focus on the specific explanatory lacunae left by alternative frameworks, and attention to the aspects of biological populations that give selection particular explanatory force. I then suggest a possible example of a successful cultural selection explanation.

5.1. The Explanatory Targets of Cultural Selection

Although there are many cases where cultural selection explanations do not offer any additional insights, some cultural selection advocates have pinpointed cultural phenomena that could be prime candidates for cultural selection explanations. Henrich (2015) identifies classes of cultural phenomena that are arguably underexplained by historical, anthropological, or sociological frameworks, and proposes that these should be a particular target of cultural selection explanations. Here, the explanatory potential of cultural selection is made clear in that specific explanatory lacuna are identified, and the aim of cultural selection explanations is to fill those lacuna. The class of phenomena that Henrich identifies is those behaviours which are adaptive (in that they are beneficial to an individual or group), but, crucially, where individuals are perhaps not aware of why these behaviours are adaptive, would find it difficult to find out why these are adaptive, and have not designed them specifically to be so. Here, accounts which rely on individual agency would perhaps struggle to explain the emergence, spread and persistence of these behaviours.

One example that Henrich uses is the consumption of cassava. Some varieties of cassava contain dangerous levels of cyanide, which if eaten without detoxification, could result in chronic health problems, such as goiter and neurological issues. However, communities in South America which rely on cassava as an important part of their diet, such as the Tukanians, have a multi-step processing technique that occurs over several days and results in detoxified and safe to eat cassava. Henrich argues that any one individual would have difficulty working out this technique by themselves, and therefore individual learning fails to explain this adaptive behaviour. This is because the poisoning is slow, and so it would be difficult to figure out the connection between eating cassava and experiencing health issues. Additionally, the cassava stops being bitter before it stops being toxic, and therefore individuals who are relying on the signal of bitterness would continue to ingest unsafe levels

of cyanide. Here the steps in this procedure are ‘causally opaque’: individuals cannot easily infer the functions or importance of the behaviours they are carrying out. His explanation of the spread of this adaptive behaviour is based on social learning biases, including the unconscious tendency of people to imitate the behaviour of more successful, prestigious, or healthier members of their community. Over time, this behaviour spreads through a cultural selection process.

This particular example has been called in question, with Mercier and Morin (2019) arguing that the ethnographic evidence suggests that the Tukanians complete the final steps of cassava processing after it has stopped being bitter because they prefer the taste and texture after these steps. However, if we take Henrich’s account of the behaviours at face value, this at least gives us an example of how a cultural selection explanation might be powerful. As Henrich describes it, it is clear that explanations in terms of individual agency or goal-directedness falter, and so cultural selection has a distinct role to play. This is very different from the cases described in the previous sections: for example, the passage of conservation laws seem to be very readily described as the product of rational thinking, or at least much conscious deliberation, of which all individuals involved would be able to articulate and reflect on. In this way, they do not present the explanatory lacuna that, arguably, the case of cassava does.

This idea is echoed in Wray (2002), where he defends the role of what he terms ‘functional’ or ‘social selection’ explanations in the social sciences. Cultural selection can be understood as one kind of functional explanation. Critics of functional explanations in the social sciences, such as Jon Elster and Daniel Little, argue that human behaviour is typically best explained intentionally, and that adequate functional explanations in fact draw their explanatory power from identifying the intentions that sustain a given practice or institution. Elster (1984) specifically argues that in order for an adequate functional explanation to be constructed in the social sciences, the function of an institution or behaviour must be unintended by the actors producing it, and the causal relationship between the behaviour and its function must be unrecognised by these actors. If these conditions are not met (in addition to others) then, according to Elster, a functional explanation will fail, and an explanation in terms of intentionality will be preferable. Although for Elster, these conditions will be rarely met, cultural selection advocates may argue that there are at least some interesting examples (such as the case of cassava processing) that do fulfil these stringent conditions.

Wray argues that functional explanations in the social sciences are concerned with explaining the consequences of intentional behaviour that cannot be explained through the intentions of agents, and this is where they have explanatory value. Functional explanations will be particularly good at explaining ‘latent functions’, i.e., a function that a behaviour has that is unrecognised by the individuals themselves. When motives and functions diverge an explanation solely in terms of motives or intentions will be insufficient to explain the persistence of particular practices or behaviours. Although he does not draw the connection to cultural selection or cultural group selection work, this corresponds to the kinds of cases that cultural selection advocates such as Henrich identify as particularly amenable to such an analysis.

Additionally, Wray emphasises the importance of not only offering evidence in support of a functional explanation, but also demonstrating deficiencies with alternative explanations of the same phenomena. This means drawing explicit comparisons with alternative explanations, and asking what is explained by a given functional explanation that is unexplained by, for example, rational choice theory. Showing that these competing individualist explanations give rise to unexplained anomalies is key to developing a compelling functional explanation.

These arguments apply directly to cultural selection cases. This does not mean that cultural selection explanations can never be usefully applied whenever any explanation in terms of individual intention is possible. It may be the case that both intention-based and selection explanations play roles in explaining different aspects of the phenomena. To return to Henrich’s cassava case, ethnographic and historical work could offer fine-grained explanations of the development and spread of the cassava processing technique, perhaps tracing the impact of particular individuals in the community. Nevertheless, the selection explanation brings genuine insights regarding the spread of this adaptive technique despite the lack of intentional design. As the intention-based explanation leaves particular lacunae, this is a case where we should expect selection-based explanations to have the potential to provide important explanatory payoffs.

5.2. The Creative Role of Selection

As has been argued in the previous chapter, we should be interested not merely in the capacity of selection to act in principle, but in ‘interesting’ cumulative selection that can build complex adaptations. This has a particular role to play in explanatory concerns. If we

adopt a weak or permissive definition of selection then we will be able to describe a wide range of cultural phenomena in these terms; however, this comes at the expense of explanatory power.

Peter Godfrey-Smith's (2009) distinction between origin and distribution explanations, as outlined in the previous chapter, is one way to understand the importance of the creative role of selection. Although a kind of cultural selection that could only factor into distribution explanations could also have explanatory value, if intention-based explanations struggle to explain the distribution of a trait within a population, we would expect the kind of cultural selection that can factor into origin explanations to have more explanatory potential. Many cultural selection advocates do seem to want cultural selection to be able to explain not only the distribution of traits but also why we find these adaptive complex traits at all (i.e., why the complex institutions such as those surrounding territorial behaviour and conservation have the adaptive fit that they do). Closer attention not just to the ability of phenomena to fit the conditions for selection in principle, but also to be able to undergo cumulative adaptive evolution, would increase the likelihood that cultural selection explanations could provide explanatory gains.

5.3. A Successful Application of Cultural Selection?

One potential case of a successful application of cultural selection is an analysis by Norenzayan et al (2016). The authors lay out a theory for the evolution of what they term 'prosocial religions'. This work perhaps provides an example of how cultural selection could be genuinely explanatory in that they identify explanatory lacunae, generate a set of specific hypotheses that follow from the cultural selection framework, and show how a selection explanation would generate a novel understanding of the given phenomenon.

They identify two 'puzzles' (explanatory lacunae): firstly, how we were able to dramatically expand the size and scale of cooperation in human societies whilst still sustaining mutually beneficial exchange, and secondly, why, over that same time period, prosocial religions emerge and spread worldwide (while remaining rare in small-scale societies, and for most of our evolutionary history).

They argue that cultural group selection, driven by escalating intergroup competition, promoted the spread and congregation of suites of religious beliefs and practices that we

would now recognise as characterising modern-day prosocial religions (for example, a moralising God, supernatural punishment, and displays of commitment). Intergroup competition would select for any traits, norms or practices which reduce competition among individuals and families within social groups, promote group solidarity, and facilitate differential success in conflict with other social groups (for example, by increasing within-group cooperation in warfare). They argue that the beliefs and practices associated with prosocial religions had the effect of increasing cooperation and group solidarity and therefore spread through cultural group selection. The group-beneficial functions of prosocial religions include: the belief in powerful, omniscient supernatural agents who are concerned with human morality (which reduce monitoring costs and facilitate collective action), ritual practices (which build group solidarity), and practices such as in-group markers (which increase group cohesion).

They also generate a set of specific hypotheses that follow from the cultural selection framework: firstly, prosocial religions spread because they contributed to the expansion of cooperative groups, which means that group size and long-term group stability should positively correlate with the prevalence of prosocial religions. Secondly, commitment to the gods of these religions should produce more norm compliance in situations without human monitoring. Additionally, religious behaviour that signals genuine devotion should induce greater cooperation and trust among religious members, there will be rituals and devotions that exploit costly and extravagant displays to deepen commitment to these gods, and cultural groups with prosocial religions should enjoy a survival advantage relative to groups without those religions. They then marshal evidence from a range of disciplines in support of these hypotheses.

Although it is possible to explain many of these in non-evolutionary terms, the selection explanation here is powerful in that it synthesises previously disparate observations, identifying a key causal process that generated adaptive outcomes, in a way that is not easily explained through individual intention or decision-making. Selection acts cumulatively in this explanation, building adaptations over time. Without a selection explanation, we are faced with a mosaic of local contextual explanations for the various phenomena. Additionally, there may be explananda that are left unexplained or poorly explained without the selection framework, such as the lack of moralising gods in hunter-gatherer societies.

It is important to note that some authors, such as Russell Gray, have questioned the hypothesis put forward here, on the basis that these ‘prosocial religions’ have other unique features that could have contributed to their success, that other processes of cultural diffusion could have contributed to the spread of these religions, and that the Abrahamic religions arose too recently to play a causal role in the emergence of the earliest large human societies (Watts et al, 2016). Without assessing the relative merits of these criticisms here, I suggest that if Norenzayan et al’s characterisation of the historical and anthropological data is broadly accurate, cultural selection would constitute a powerful explanatory tool here, bringing genuine insight and understanding that alternative frameworks cannot. It may be the case that the empirical evidence ultimately tells against this hypothesis; nevertheless, this work is suggestive of the way in which cultural selection frameworks could be meaningfully explanatory over and above alternative approaches.

6. Conclusion

Cultural selection explanations have the potential to bring novel insights into cultural phenomena. However, a lack of attention has been paid to the precise explanatory, predictive and practical gains we should expect from utilising cultural selection frameworks, over (for example) historical or anthropological ones. Arguments for cultural selection frequently rely on the Lewontin conditions, only demonstrating that selection models can be applied to culture, without explicitly demonstrating the explanatory dividend that arises from their application. This is a particularly important when considering the potential practical payoffs: it has been suggested that employing cultural selection models could bring tangible benefits in terms of explaining innovation and sustainability science. Understanding what unique explanatory gains we can expect from cultural selection is crucial, if we wish to realise these practical benefits.

The case of Waring and Acheson’s work on lobstering in Maine is an example of how a ‘selection gloss’ can be applied to cultural phenomena, without any explanatory gains compared to historical or anthropological accounts. This is not limited to this particular case, but applies to wider efforts to use cultural selection in sustainability science, and beyond. In many of these cases intention-based explanations work just as well. Additionally, applying such a ‘selection gloss’ to cultural phenomena may be confusing rather than illuminating, and prevents any practical benefits from being realised.

However, cultural selection frameworks do have the potential to be meaningfully explanatory. Greater attention to the particular explanatory lacunae left by alternative explanations, typically when there are phenomena that cannot be explained through individual intentions or agency, and to the need for cumulative selection that could build complex adaptations, would increase the likelihood that cultural selection explanations could be successful.

The case of the application of cultural selection to sustainability science has provided a clear demonstration of how selection explanations can be applied to phenomena whilst offering no explanatory payoffs over and above alternative frameworks. In the next chapter I will build upon this, turning to models of cultural group selection as developed by authors such as Richerson, Boyd, and Henrich. Cultural group selection has been taken to be a potentially powerful explanation for widespread cultural phenomena, including the extensive cooperation that characterises human societies. I analyse both the formal modelling work and key case studies developed in support of the various cultural group selection processes that have been proposed, arguing for skepticism regarding its scope and plausibility.

Chapter 3

What Can Cultural Group Selection Explain?

1. Introduction

As argued in Chapter 2, cultural selection frameworks can be applied in ways that mean they have little explanatory power. Given that the cultural phenomena that cultural selection frameworks are applied to typically have alternative explanations (e.g., historical, anthropological, or sociological ones), we must think carefully about the explanatory gains that cultural selection offers over and above existing models, frameworks and methodologies.

In the case of sustainability science, I have argued that the application of cultural selection explanations, and cultural multilevel or cultural group selection explanations in particular, often fail to offer any such additional explanatory benefits. I have characterised this as applying a ‘selection gloss’ over a set of phenomena, where any explanatory power stems from the non-selection part of the explanation (for example, a historical account). The use of selection terms in these cases does not give us any additional insights, and may lead to conceptual confusion. In part, this problem stems from a trade-off between generality and explanatory power, where more minimal definitions of selection will apply to a greater set of phenomena, but at the cost of the value of applying those selection models as explanations. In Chapter 2, I suggested that the selection concepts used in the context of sustainability science were typically even more permissive than those used in the cultural selection literature more generally, and this posed a particular problem for their application.

In this chapter I build upon this by undertaking an assessment of the explanatory scope and plausibility of cultural group selection (CGS), as developed by authors such as Peter Richerson, Robert Boyd and Joseph Henrich. Cultural group selection can be understood as a set of processes that vary in their similarity to biological group selection, but are typically

described as ‘selective’ in the sense that they adhere to the Lewontin conditions, ‘cultural’ in that it is cultural traits that are being selected for or against, and at the ‘group’ level because group structure plays at least some role. Some groups do better than others due to differences in culturally transmitted traits, and so CGS is a process which, in principle, explains the spread of group-beneficial traits throughout a population.

The aim of this chapter is to evaluate CGS as an explanatory tool, both with respect to the phenomena it has been invoked to explain, and its explanatory scope in principle.

Understanding the explanatory power and limitations of CGS frameworks is important not only on its own terms, but also in order to realise any potential practical benefits of successful applications of CGS models (e.g., in sustainability science, or innovation). An exhaustive examination of the extent to which CGS can explain the range of cultural phenomena it has been invoked to explain, and the explanatory capacity and scope of the various processes that have been considered to fall under the umbrella of CGS cannot be accomplished within a single chapter. However, here I will highlight several themes that occur in CGS work in order to cast doubt upon the plausibility of CGS as a powerful explanatory force. In general, arguments for CGS rely both on stylised models and a handful of supposed real-world cases. I argue that firstly, formal models of CGS processes rely crucially on idealisations that are unlikely to hold in the real world; secondly, if we construe CGS processes in a way that does not rely on these idealisations, they no longer have any explanatory payoff compared to intention-based accounts; and thirdly, one of the key cases cited in support of CGS is not in fact well explained by CGS, casting doubt on the explanatory capacity of CGS generally.

My analysis centres around the three CGS processes that are often identified in the cultural evolution literature (e.g., Richerson and Boyd, 2005; Boyd and Richerson, 2010; Richerson et al, 2016): selective migration, selective imitation, and intergroup competition. In Section 2, I outline the motivation for developing CGS accounts of cultural phenomena. In Section 3, I argue that, although CGS does not need to cleave closely to accounts of biological selection in order to be useful, CGS processes do need to bring the explanatory benefits of invoking selection. I then turn to the problems with formal models of CGS processes, focusing on selective imitation and selective migration, in Section 4. I argue that models for both of these processes rely on significant assumptions about social learning, that are unlikely to hold.

Once we remove those assumptions, these models can no longer derive ‘interesting’, selective results. In Section 5 I consider ways of construing selective imitation and selective migration

that focus on the spread of group traits, and that may avoid these implausible social learning assumptions. However, I argue that these versions of the processes lose their explanatory power, and no longer provided any benefits over an intention-based account. In Section 6 I consider a key case cited in support of intergroup competition, one of the three main CGS processes. Although intergroup competition in principle closely resembles cases of ‘paradigm’ Darwinian selection, and therefore can have the corresponding explanatory power, a closer examination of the case of the Nuer and the Dinka demonstrates that CGS does not provide a strong explanation here. Therefore, at least in this case, the example used to justify a CGS approach does not match the theoretical rationale. Taken together, these problems call into question the explanatory scope and plausibility of CGS.

2. Motivating CGS Explanations

The problem of cooperation is one that has troubled biologists since the early beginnings of evolutionary theory. Cooperative and prosocial behaviours are seen in a vast array of taxa, ranging from biofilm production in bacteria to the complex social structures of the eusocial insects. Often cooperative behaviours are altruistic, in the sense that they incur a cost to the individual performing the behaviour, while conferring a benefit to an individual recipient, or to the group as a whole. This poses an obvious initial problem for explanations based upon individual selection. This is because these behaviours spread despite being, on the face of it, detrimental to individual fitness, and groups with these behaviours can be stable and resist being overrun by ‘cheats’ (individuals that reap the benefits provided by altruistic members, without incurring the cost of contributing themselves).

The problem of cooperation in species other than humans is the subject of a robust and long-standing research tradition, which has to a large extent been resolved and fully incorporated into evolutionary theory. Although there have been deep disagreements over the relative importance of various processes, such as the role of group selection versus kin selection and reciprocal altruism, there is general acceptance that evolutionary theory has the necessary resources to explain the problem of cooperation in the biological world. Many biologists would assert that these same mechanisms can be extended to understand human cooperation (West et al, 2011). However, some authors have pushed back against this, arguing for the necessity of a process unique to humans, in light of the unique nature of human societies.

Human societies are incredibly complex and highly cooperative endeavours, involving massive division of labour and very high levels of coordination and integration between individuals performing various social roles. They typically have developed social institutions which constrain and shape the set of behaviours individuals can perform and the expected payoffs for behaviours within this set, setting norms and systems of punishment for those that deviate from prescribed norms. These social institutions, which range from conventions such as driving on the left side of the road, and queueing, to complex institutions such as marriage and systems of governance, structure social interaction and allow for the extensive cooperation we see in all modern-day human societies. In this sense, the scope and extent of human cooperation seems to render it qualitatively different from cooperation in other species (Henrich, 2015).

The intuition that human cooperation is somewhat unique has led authors such as Joseph Henrich, Peter Richerson and Robert Boyd to argue that the processes that are used to convincingly explain the kinds of cooperation or altruism we see in taxa such as the eusocial insects are inadequate when applied to human cooperation. Kin selection and reciprocal altruism seem to fail as explanations for the many cooperative or altruistic interactions that occur between unrelated individuals, which are often unrepeated, with no opportunity for reciprocation (and often no opportunity for reputation-building either). Furthermore, there appear to have been extensive interactions between unrelated individuals stretching far back in human history. Dyble et al (2015) find evidence for low relatedness within hunter-gatherer bands, which they attribute in part to pair bonding and therefore movement of partners away from kin. Richerson and Boyd (2005) argue that this long history of cooperation between unrelated individuals seems to make a kind of 'big mistake' hypothesis also unlikely. By 'big mistake', they mean the conjecture that kin selection and reciprocal altruism shaped human behaviour in the past, in environments where most interactions were between kin or where there was a high probability of reciprocation, resulting in the persistence of this behaviour even when our social environments shifted significantly.

The inadequacy of existing explanations for cooperation has motivated attempts to develop new theories to explain the unique nature of cooperative behaviour in human societies. CGS is one such prominent attempt. CGS is typically invoked as an umbrella term for a family of processes which are thought to have shaped human behaviour over generations, and allowed for the cumulative evolution of complex social structures such as institutions. CGS broadly aims to explain the spread of group-beneficial traits, and the development of group-beneficial

adaptations. These traits spread because of persistent cultural differences between groups, causing some groups to be more successful than others and thereby outcompete other groups in some way, resulting in the traits of the more successful group increasing in frequency in the population.

‘Group selection’ is a contentious term amongst many biologists working on social evolution, and its importance in shaping cooperative behaviour has been hotly debated (Borello, 2005). Initial attempts to explain group-beneficial traits in terms of ‘the good of the group’ in the 1960s, most famously by Wynne-Edwards in his 1962 book *Animal Dispersion in Relation to Social Behaviour*, were found to be fatally flawed by biologists such as Maynard-Smith (1964), who exposed the vulnerability of altruistic groups to the invasion of selfish individuals. Following this, group selection became an unpopular avenue of research, but was later revived by authors such as Sober and Wilson, who showed that altruism can evolve, with group structure playing a role, under certain conditions (Wilson and Sober, 1994). Using Price’s formalism, the development of the multi-level selection framework reconciled kin selection with group selection, reframing them as different ways of describing the very same process (Price, 1970, 1972).

However, many biologists argue that robust forms of group selection that require group reproduction are rare in the biological world (Gardner, 2015; West et al, 2007). In contrast to this, cultural group selection proponents argue they are able to sidestep the traditional group selection debate, avoiding the common objections that undermine the plausibility of group selection as a potent force in many cases in the biological world. In particular, the force of genetic group selection relies on minimal within-group variation and maintenance of between-group variation, which is easily eroded with even relatively low levels of migration. Minimal within-group variation is important because too much variation within groups will lead to competition and selection on lower levels; between-group variation must be maintained because selection cannot act without variation in the population. However, although human groups are rarely genetically homogeneous, they can be culturally so (for example, in that all members of the group share certain norms and partake in the same social institutions). CGS therefore has the potential to avoid the main pitfalls of genetic group selection. It achieves this, according to its proponents, due to unique features of culture and cultural transmission (Henrich, 2004).

Various social learning biases have been proposed as mechanism of minimising within-group variation. One such example, given by Joseph Henrich (*ibid*), is conformist bias, a bias that leads individuals to adopt the most common cultural variant in their group. Another social learning bias that would minimise within-group variation is prestige bias, where individuals tend to adopt the cultural traits of the most prestigious individuals in the group (discussed in more detail in Chapter 4). These biases may also feed into the maintenance of between-group variation, alongside in-group/out-group dynamics and the development of ethnic markers, which bias people towards adopting traits of those within their group (McElreath et al, 2003).¹¹

As will become clearer in the following sections, the CGS processes that have been proposed vary in their mechanism. CGS does not constitute a single, well-defined process, but is rather a loose family of processes that bear differing levels of resemblance to each other. These processes vary in the extent to which they resemble biological group selection, and in their explanatory power and scope. The reason for this may be precisely because CGS was created to fill a specific explanatory gap, with an expected explanatory payoff: understanding why the nature of human cooperation differs from cooperation in non-human species. The processes that have been outlined in the literature are all linked by this supposed explanatory lacuna, and have been conceived as a direct response to the extensive and unique forms of cooperation in human societies and the perceived inadequacy of existing social evolutionary processes to explain these phenomena. There are many aspects to human cooperation, and therefore perhaps many different processes that could feed into a potential explanation.

Despite its origins, CGS has not been restricted to the problem of the evolution of cooperation. CGS explanations have also been proposed for a range of other cultural phenomena, such as the emergence of prosocial religions (Norenzayan et al, 2016) and competition between firms (Richerson et al, 2016). When it comes to the broad applicability of CGS, it is important to understand the exact nature of these processes, the conditions that they can require, and the potential for distinctive explanatory insights. For example, processes that seem compelling in the context of competition between hunter-gatherer bands may have less to offer in an analysis of competing firms, particularly when considering the explanatory gains in comparison with existing economic models. In my analysis, which

¹¹I will note that the existence and prevalence of these social learning biases has been called into question (e.g., Lewens, 2015), and the extent to which the plausibility of CGS depends on these biases is discussed further in Section 4.

considers the processes of selective migration, selective imitation, and intergroup competition, I highlight tensions between the formal CGS models and qualitative descriptions, as well as the use of different cases, with the overall aim of assessing the kinds of phenomena that CGS can explain.

3. Is CGS ‘Selection’, and Does it Matter?

One question we could ask regards the extent to which CGS processes in fact resemble selective processes, in comparison to examples of ‘paradigm’ biological selection. As argued in Chapter 1, this question seems misguided. Cultural systems bear many disanalogies with biological systems, and therefore we might expect cultural selection processes to work very differently than biological selection processes. For example, Ramsey and De Block (2017) note that cultural fitness concepts have real and substantial differences from biological fitness concepts. Nevertheless, they argue that we can build a concept of cultural fitness that can do the necessary work in feeding into cultural selection explanations. It could be argued that terminology is relatively unimportant here: if CGS frameworks are putting their finger on a process that is genuinely explanatory but importantly dissimilar to biological selection, they are useful whether or not they count as ‘selection’.

However, a resemblance to biological selection could be important insofar as using the term ‘selection’ invokes certain conceptual machinery. One distinctive value of selection explanations in biological systems is their capacity to explain ‘design without a designer’. As argued in Chapter 2, the explanatory value of cultural selection stems from the same problem, explaining adaptive cultural traits without reference to intention or agency. The explanatory landscape looks different in culture than biology: in the biological world we see a multitude of adaptations which need to be explained without reference to intentional design, whereas in the cultural world intentional explanations often work well.

This does not mean that CGS must follow the exact same structure as biological group selection, and indeed we would expect it to have important differences. However, it does need to be able to do similar explanatory work; namely, explaining adaptations without intention. Godfrey-Smith (2009) describes a continuum between paradigm and minimal Darwinian populations, and therefore between paradigm and minimal cases of selection. This is connected to the capacity for selection to enter into both origin and distribution

explanations, rather than only distribution explanations (as laid out in Chapter 1). This means that the kind of selection at work should be the kind that is cumulative and capable of producing adaptations in order to be meaningfully explanatory, rather than a minimal kind. Therefore, the question we should be asking is the extent to which a given CGS process can be cumulative and adaptation-building, thereby explaining adaptive cultural phenomena which are difficult to explain using other frameworks.

This emphasis on explanatory capacity is compatible with the argument that CGS need not be strongly analogous to biological group selection in order to have value. There are debates over whether cultural selection should be considered Darwinian or Lamarckian, due to phenomena such as guided variation (Kronfeldner, 2007). Additionally, as has been noted by many authors, key concepts in cultural selection do not have systematic definitions or solid theoretical grounding, such as cultural fitness, or the units of cultural selection (Wimsatt, 1999; Crozier, 2008). However, this is not completely unique to cultural evolution: we see similar debates in the context of evolutionary biology over the appropriate fitness concept, or population concept, for example (e.g., Ariew and Ernst, 2009; Stegenga, 2014). The lack of a single fitness or population concept has not hampered the capacity for natural selection to be a powerful explanation for organismal adaptation, amongst other phenomena, suggesting that this should not be a barrier for the application of cultural selection (or CGS in particular). In Chapter 1 I demonstrated that the lack of a reproductive process need not be an obstacle for cultural selection to get off the ground; it seems that disanalogies between cultural and biological systems more generally should not preclude CGS from being an important explanatory force.

However, these disanalogies should not be entirely ignored, even when we are focused on the explanatory gains of CGS. The resemblance between CGS and biological group selection can matter insofar as it impacts pragmatic payoffs. Considering Godfrey-Smith's minimal to paradigm continuum is useful in that it highlights how minimal cases might be able to be described in selection terms without selection being a powerful and interesting explanation, whilst cases towards the paradigm end of the continuum can undergo cumulative adaptive evolution with clear explanatory gains, even if paradigm cultural cases do not resemble paradigm biological cases in key respects (such as in the existence of reproduction).

To illustrate this with an example, it may be the case that group structure plays some kind of role in explaining the spread or persistence of a trait, and this could be construed as a

CGS explanation. For example, the larger a group is, the more likely they may be to develop novel traits (simply because there are more individuals to have creative ideas). This is a kind of group selection that Darwin gestured at in *The Descent of Man* (1871, 154), writing that, “*if one man in a tribe [...] invented a new snare or weapon, the tribe would increase in number, spread, and supplant other tribes. In a tribe thus rendered more numerous there would always be a rather better chance of the birth of other superior and inventive members*”. Therefore, if cultural traits cause a group to become more successful and increase in size, and this makes the development of novel traits more likely, this could be said to be a form of CGS (perhaps selective migration, if the size increase is the result of immigration).

However, group structure here is playing a minimal role. Crucially, it is not contributing to the explanation of the ‘adaptive fit’ of a trait, or the cumulative building of a trait. Rather, it is simply making it more likely that anything novel will be produced. This kind of case may be more of an argument for the kind of broad ‘population thinking’, or kinetic approach, that is also part of Richerson and Boyd’s framework, rather than for bringing in selection machinery. Even if we are to concede that this could still meaningfully be termed CGS, and this meant that CGS has a broader role to play in explanations of human cultural change, the explanatory power of this kind of minimal CGS is limited. If the main form that CGS takes in real-world cases is of this limited, minimal kind, then it cannot be a primary explanation for extensive human cooperation, or for the emergence of key prosocial institutions, or for the development of norms within firms.

In this chapter I will focus on the three processes outlined by Richerson and Boyd (intergroup competition, selective imitation and selective migration) as they are the most fleshed out accounts, and have been used in other areas (such as in the application of CGS to sustainability science). Intergroup competition is a CGS process that closely resembles biological models of group selection, and therefore its explanatory capacity in principle is clear. However, selective imitation and selective migration differ significantly from ordinary understandings of group selection, and so their explanatory scope is less clear. Morin (2019), in his critical review of Cecilia Heyes’ 2018 book *Cognitive Gadgets*, suggests that the inclusion of selective imitation and selective migration as kinds of CGS “dilutes” the CGS thesis. His contention is that this constitutes jettisoning the key claim of CGS, which is that changes in the composition of defined groups drives cultural evolution, and replaces it with “nothing specific”.

However, as I have argued here, requiring that CGS processes must strongly resemble biological group selection is too demanding, and any resemblance should only matter insofar as it affects explanatory payoffs. Here, I focus on these payoffs, highlighting three kinds of problems with CGS: that formal models of CGS processes rely on implausible idealisations, that when we construe them in ways that discard these idealisations they no longer bring meaningful explanatory benefits, and even when a CGS process in principle can be explanatorily powerful, cases used as examples of CGS fail to demonstrate the usefulness of CGS explanations.

4. Plausibility of Assumptions in Modelling CGS

Many of the arguments for the plausibility and significance of CGS depend upon formal modelling work which shows that, under certain conditions, these processes can lead to cumulative adaptation. However, these models typically involve sets of idealisations and theoretical assumptions that we should expect to depart in crucial ways from the real world. In this section I will argue that it is these theoretical distortions that are in part responsible for deriving the interesting results of the models, and if the particular idealisation and assumptions are not upheld, we have reason to doubt the explanatory payoffs of these CGS processes. Here, I will focus on two models by Boyd and Richerson of the processes of ‘selective imitation’ and ‘selective migration’, showing that in both these cases the success of the models depends on implausible assumptions.

In the following sections I draw a distinction between individual traits and group traits: in the models discussed in this section, Boyd and Richerson focus on individual traits that are group-beneficial. In the following section I will examine versions of their CGS processes that revolve around group traits. Individual traits can be understood to be cultural traits that can be held by an individual: an example of a group-beneficial individual trait might be polite mannerisms. This is a behaviour expressed by individuals, but may have a positive effect on the group, through promoting group harmony and increased cooperation, for example. In contrast, a group trait refers to a trait that is not held by individuals and cannot coherently be reduced to individual traits. One example could be a system of political centralisation: although individual behaviours are what make up such a system, this trait cannot be decomposed into sets of varying individual traits, and it makes no sense to say that a single person ‘has’ political centralisation.

4.1. Modelling Selective Imitation

'Selective imitation of successful groups' refers to the phenomenon whereby members of less successful groups copy members of more successful groups, a process which favours the spread of group-beneficial norms and institutions (Richerson et al, 2016). According to the authors, selective imitation is 'cultural group selection' in the sense that the successful cultural traits of groups spread throughout the population of groups (as other groups imitate the groups that are perceived as more successful). This process can therefore explain the spread of group-beneficial behaviours even when individually detrimental.

A formal model of this process is constructed in Boyd and Richerson (2002), which is intended to show that this process allows for the rapid spread of group-beneficial norms throughout a structured population. This model assumes a population divided into a number of large subpopulations (groups), where individuals comply with one of two strategies. In this case, they assume that individuals who deviate from whichever strategy is common in the group are punished by other members of the group. Therefore both strategies have associated costs to the individual when rare, and so have a higher relative payoff when common. The example they use is marriage norms: strategy 1 is a norm forbidding marriage between cousins, and strategy 2 allows an individual to freely choose a spouse. Groups where strategy 1 is common have a higher average payoff (in this example, they suggest that a norm forbidding marriage between cousins could lead to more alliances between clans within the group). They then assume that some process has already caused the group beneficial strategy to become common in one of the groups, with the other strategy common in all other groups in the population.

During each time period, there is a probability that an individual from one group will encounter an individual from another group, and therefore observe their strategy and associated payoff. They will then imitate this strategy with a probability based on the difference in payoffs between the behaviour of the observed individual and the observer. This allows for transmission of cultural traits between groups, and reflects a scenario where individuals are aware not only of the norms and behaviours in their own group, but also those in other groups, and have some knowledge of how successful these traits are. Therefore, if enough individuals in groups where strategy 2 is common imitate individuals in groups where strategy 1 is common, these groups will be pushed into the basins of attraction for

strategy 1, and strategy 1 will then increase in frequency. Eventually, this will spread throughout the population of groups.

Selective imitation appears to have the capacity to be a cumulative, adaptation-building process. Even if there is no group reproduction (production of offspring groups), we can imagine a scenario where a norm spreads through a population of groups through selective imitation, eventually reaching fixation. Then, a refinement on this norm appears in one of these groups (which is more likely to arise, as now more individuals are using this norm), and spreads throughout the group, and then throughout the population of groups. This could happen over and over again, until we see a complex adaptive institution that many groups share, which can be in part explained by this process of selective imitation. Even if the spread of the norm through the initial group is not explained by selective imitation (it could be powerful individuals imposing the norm, for example), the spread of the norm between the groups could still be explained by selective imitation. However, this depends on a set of assumptions about social learning.

4.2. Plausibility of the Selective Imitation Model

The results of this model rely on a substantial assumption about social learning. In the model, individuals imitate strategies with higher payoffs within the group the observed individual belongs to, even though it would lower their own payoff in a group where that strategy is rare. To take Boyd and Richerson's example of cousin marriage, Individual 1 in a society where cousin marriage is common would observe Individual 2 in a society where cousin marriage is forbidden. Individual 2 would have a higher payoff than Individual 1 (because they have greater alliances with other clans), which Individual 1 would be able to observe. They then adopt this trait, marrying someone who is not their cousin, even if they are socially punished for this in some way. On the face of it, this seems like an implausible scenario.

Boyd and Richerson argue that this assumption is in fact plausible by turning to the social learning rule 'imitate the successful'. They argue, as they have in other instances (e.g., Boyd and Richerson, 1985), that 'imitate the successful' is a cognitive rule-of-thumb that is likely to have arisen in our psychology because of its supposed adaptive benefits. These adaptive benefits arise when it is costly or difficult for individuals to directly evaluate the likely payoff of a given behaviour or strategy. They suggest that when most individuals followed the

‘imitate the successful’ learning rule, a group beneficial trait will spread at a roughly similar rate to the rate that an individually beneficial trait would spread within a group.

Therefore, the plausibility of their selective imitation model as a process that drives the spread of group-beneficial behaviours depends upon the plausibility of the social learning rule ‘imitate the successful’ in this case. Whilst there may be scenarios where this rule provides clear adaptive benefits in information-poor environments, in the way they have used it in their model it is clearly maladaptive. We therefore would need to propose that ‘imitate the successful’ is such an ingrained social learning bias that individuals carry it out even in the face of clear negative consequences, such as social sanctions. This requires us to see individuals as being almost entirely guided by unconscious or unconsidered social learning rules, limiting the role of rational decision-making to an implausible degree¹². There is a further tension here, where individuals simultaneously are governed by these broad rules, and yet are able to rationally deliberate effectively enough to calculate the payoffs of individuals with reasonable accuracy (in order to determine that individuals in other groups have higher payoffs and so should be copied).

Furthermore, ‘imitate the successful’ is construed here as an exceptionally broad social learning rule. We could posit another version of rule emerging, such as ‘imitate the successful people in your own group’. Individuals who follow this modified rule would do better than individuals who follow the general ‘imitate the successful’ rule, as they would avoid imitating traits that would incur costs when expressed in their own group. If this modified rule spread, then individuals would no longer imitate successful individuals in other groups, and Boyd and Richerson’s account of selective imitation could not get off the ground.

4.3. Modelling Selective Migration

We see a similar theme emerging when we turn to a model of another CGS process. As described in Richerson et al (2016), ‘selective migration between groups’ is a process where individuals in less successful groups migrate to more successful groups when they observe that the more successful group holds norms that benefit all members. The less successful

¹² Apesteguia et al, 2004 carried out experimental research which suggests that, in fact, individuals are able to flexibly deploy the ‘imitate-the-successful’ rule when there appears to be a rational case for it, and often do so intentionally.

groups therefore become smaller over time, and may eventually become extinct, or choose to adopt the norms and institutions of the more successful group.

They consider this process ‘group selection’ in the sense that groups perceived as more successful grow through gaining new members, and because this process can potentially explain the spread of group-beneficial behaviours even when they are individually detrimental, which has typically been the motivation for group selection explanations in the biological context. This is ‘cultural’ because it is aspects of culture that are responsible for the differential success of groups, and therefore differential migration. They further justify the characterisation of selective migration as group selection by appeal to the Lewontin conditions (i.e., cultural variation between groups, fitness differences in terms of military or economic advantage, and inheritance in terms of group persistence over time). Richerson and Boyd (2002) consider selective migration, along with selective imitation, to be the most common of their three processes (in contrast to intergroup competition, which they see as relatively rare and acting over long timescales).

The formal model of this process can be found in Boyd and Richerson (2009), where they term it ‘payoff-biased migration’. The model represents a case where different social norms become stabilised in different groups, these norms differ in their average payoffs, and this difference causes individuals to move from one group to another. Their model assumes a population divided into two large subpopulations (groups). Within these groups, individuals exhibit one of two behaviours, and the groups can vary in the proportion of member individuals who exhibit behaviour 1 versus behaviour 2.

Both behaviours can be evolutionarily stable strategies (ESSs), but one may have a smaller basin of attraction than the other (i.e., the payoff to individuals depends upon the frequency of the behaviour in their group). Groups in which behaviour 1 is more common have a higher average payoff¹³ than subpopulations in which behaviour 2 is more common. However, when behaviour 1 is rare there is a cost to individuals that exhibit it, and therefore it will not invade a group and become common (similar to the frequency-dependent payoffs in the selective imitation model). Behaviour 2 has no such associated cost, however, in a group where behaviour 1 is common, individuals exhibiting behaviour 1 have a higher payoff than those exhibiting behaviour 2, so behaviour 2 cannot invade either.

¹³ It is not specified what form this payoff may take, although group reproduction is not part of their model. We could construe payoff in terms of effects on the welfare of individuals (greater economic success, perhaps).

This setup reflects the dynamics of a situation where the behaviours in question have some coordination dimension. For example, behaviour 1 could be a high bride price, and behaviour 2 could be a low bride price. Overall, groups with high bride prices have higher average payoffs (perhaps because high bride prices necessitate alliances between families, which leads to greater military success, and therefore greater control over resources). However, in a group with a low bride price, demanding a high bride price may be seen as norm-breaking and be punished (and vice versa).

Some switching of behaviours occurs at the beginning of each time period, where the individuals observe a randomly selected member of their own group and switch behaviours with a probability which is proportional to the difference in payoffs between the observer and target individual.¹⁴ At each time period, a fraction of individuals from both groups migrate to the other group. These fractions are determined by the difference in average payoffs between the two groups, and the extent to which the difference in average payoffs plays a role in individual migration decisions.

Their analysis of the model suggests that when migration rates are low, and local adaptation maintains variation among groups, populations will evolve towards an equilibrium where the most group beneficial behaviour is more common, but other behaviours also persist. However, when migration is a stronger force than local adaptation, which behaviour becomes more common is highly dependent on the initial sizes of groups and of the basins of attraction of each behaviour. They therefore conclude that selective migration can act as a strong evolutionary force, if migration rates remain low compared to processes that maintain between-group variation.

4.4. Plausibility of the Selective Migration Model

The Boyd and Richerson model of selective migration, like their model of selective imitation, is focused on individual traits. Group trait interpretations of these models have different pitfalls, which will be discussed in the following section.

¹⁴ This switching only occurs within a group; individuals do not switch their behaviour based on observing individuals from other groups. This is because this forms part of another CGS process, selective imitation, and Boyd and Richerson intend to screen off the effects of other CGS processes in order to focus on the effects of selective migration.

This model runs into similar problems as their selective imitation model: namely, implausible assumptions regarding social learning. In their model, individuals observe the average payoff of other groups, and are more likely to migrate to a group with higher average payoffs for its members. This requires the ability for individuals to make complex calculations regarding average payoffs and compare these across different groups (or at least, between another group and their own). Assessing groups' payoffs may have been particularly difficult in the context in which selective migration is proposed to have played a key role in driving the spread of extensive cooperation, i.e., in the distant human past, where hunter-gatherer bands were competing. This was an information-poor environment, particularly in comparison to the globalised, information-rich context we now inhabit. Even if such an assessment is possible, we run into the problem of explanatory power of a selection explanation in this case, over an intention-based explanation (which will be discussed further in the following section).

Furthermore, this seems like a particularly implausible idealisation of migration decisions. Departures from this idealisation will have crucial impacts, as it is this idealisation that drives the appeal of a selection based model to explain this process in the first place. In particular, migration decisions are likely to be based on a wide variety of factors, of which the perceived average payoff of group members may play a very small role. Clearly, the adaptive outcomes of selective migration depend upon the differential payoffs between groups playing a role in migration decisions. However, it appears implausible that migration decisions are heavily influenced by the assessment of average payoffs of other groups, to the extent that this assessment is possible at all. Additionally, even when information about payoffs is available, we would expect migration decisions to be influenced by other factors such as geographical proximity and how welcoming other groups are to migrants. Furthermore, even if migrants do desire to move to other groups based on perception of success, this does not mean that this will be possible, and be where they in fact migrate to. For example, refugees from the recent Syrian Civil War may desire to migrate to a highly economically successful country such as Sweden. However, a large number have ended up in Lebanon, due to the geographical proximity, amongst other factors (United Nations High Commissioner for Refugees data, 2019).

A further problem is with the way assimilation is idealised in Boyd and Richerson's model. In the real world, assimilation is likely to be very different to the simple switching to, or adopting of, cultural traits of another group. For example, immigrants to a given society may be likely to adopt certain group norms and institutions (because membership of that group

necessarily entails this, or because they would incur high costs if they did not do so), but may be significantly less likely to adopt the kinds of individual-level traits that they are not required to adopt. Alternatively, there may be a complex melding of traits from the group they have left and the group they have joined that is not captured by Boyd and Richerson's 'switching' behaviour. This means that, even if we see more successful groups attracting more individuals, this will not necessarily be an explanation for the spread of a given trait.

5. *Explanatory Payoffs of CGS Models*

I have argued that the models of selective imitation and selective migration depend critically upon key idealisations or assumptions that very likely do not hold. However, there may be ways of construing selective imitation and selective migration that avoid these assumptions. Here, I focus on versions of these processes that explain the spread of groups traits. These might escape the implausible assumptions that underlie the models in their current form; however, they face a different problem. Even if we grant the premises of these processes, as understood as concerning group traits, there is little explanatory payoff to understanding these changes in terms of selection.

5.1. *Selective Imitation of Group Traits*

A version of selective imitation that explained the spread of group traits would involve individuals having a general knowledge of norms, institutions and behaviours in neighbouring groups, and collectively deciding to adopt them as a group (or being imposed upon the group by powerful individuals). It is unclear whether Boyd and Richerson want to limit 'selective imitation of successful groups' to individual traits, and tie it to individual social learning rules in all cases. One possible example of this is in Boyd and Richerson (2010), where they detail the rapid spread of Christianity in the Roman Empire as an example of selective imitation. They describe the conversion of many Romans to Christianity as due to a perception of a better quality of life in the Christian community, and the creation of a "miniature welfare state" in Christian communities. The creation of the 'welfare state' could be closer to a scenario where individuals have general knowledge of neighbouring groups' norms than the individual to individual imitation outlined in the 2002 model, with potential for group traits to play a role (in terms of institutions that all individuals contribute to maintaining, but are not transmitted wholesale from one individual to another).

In a scenario where groups adopt the traits of other groups, the role of general knowledge and rational deliberation seems prominent. In these cases, the adoption of group traits would require agreement by the members of the group, and perhaps top-down imposition of the new group traits. As argued in the previous chapter, cultural selection explanations are most likely to succeed where phenomena are un- or under-explained by intention or agency based models. It is difficult to see how a selective imitation model in these cases would provide additional explanatory payoffs over and above an account which tracked the intentions of group members in coming to a decision to alter group norms or institutions.

To use an example from the previous chapter, a state might decide to adopt conservation legislation from a neighbouring state if lawmakers observe the effects of that legislation to be group-beneficial (to have positive outcomes for that state, say). We could describe this as selective imitation of group traits: a group trait (a particular piece of legislation) has spread to another group, due to the group-beneficial properties of that trait. However, as in the conservation cases considered previously, it is entirely unclear what the benefits would be of describing this as CGS. An alternative account which describes this spread as the result of intentional actions on the part of lawmakers and their constituents would bring the same explanatory benefits.

This concern is echoed in the criticisms of Richard Lewontin, who has repeatedly critiqued cultural evolutionary work for its inability to accommodate the phenomenon of power. Lewontin has argued that the existence of powerful individuals and institutions who are able to enact cultural change prevent us from, for example, drawing straightforward connections between the ‘fitness’ of a trait and its ability to spread through a group (Lewontin, 2005; Fracchia and Lewontin, 2005). This is because the spread of a particular cultural variant over another could be due to the backing of powerful individuals or groups, rather than aspects of the cultural variant itself. In our conservation legislation case, it certainly seems that an account of power would be a central part of the explanation: the ability for legislators to cause their group to instantiate a given trait is due to power structures within that group. In many cases of the spread of group traits we might expect power to play a key explanatory role, and the ‘methodological individualism’ of cultural evolutionary work means that it is very difficult to use the resources of cultural selection to explain power (Lewens, 2015).

Furthermore, even if we set aside the question of power in these cases, we are still left with a tension between intention-based and selection explanations. We could imagine a group with a flat power structure, where all individuals have approximately equal power within the group¹⁵, who collectively decides to adopt a particular group trait. Even though we do not have the tricky phenomenon of power to grapple with in our selective imitation model, the selective imitation model will not be doing much explanatory work. Rather, an account of the intentional decision-making of the group members will be crucial.

5.2. *Selective Migration of Group Traits*

Similarly, we could understand selective migration in terms of group traits: groups would possess one of a number of cultural traits, such as varying levels of political or economic centralisation, which would have an effect on group success or group payoffs. Group payoffs could be defined in any number of ways, but would not be averaged individual payoffs. For example, groups with greater centralisation may be able better able to distribute resources, which leads to greater growth and perhaps more production of offspring groups. Individuals that chose to migrate to a more successful group would automatically ‘assimilate’, in the sense that membership of the group necessarily entails partaking in some group institutions.

If we think about it in terms of group traits, it is not clear that we would see similar results to the Boyd and Richerson model of selective migration, or that selective migration would be ‘selective’ in the relevant sense. For example, in Boyd and Richerson (2002) they briefly discuss the ancient complex societies of China, Rome and India, which grew substantially by immigration and assimilation rather than only by invasion, as a potential example of selective migration. A substantial aspect of why selective migration occurred in these cases, and what assimilation means, would involve group traits, such as the complex institutions that characterised these societies.

The problem with selective migration in this sense as a selection explanation can be made clearer if we imagine these cases as representing a system where there is one successful group, which individuals who are members of other groups migrate to, and therefore immediately

¹⁵ Anthropological work has suggested that early hunter-gatherer groups, as well as many modern-day hunter-gatherer societies, were and are generally egalitarian (Woodburn, 1982). Therefore, if CGS aims to explain the original development of widespread cooperative tendencies, perhaps its difficulty with accommodating power is not a fatal flaw. However, we are still left with the problem of its explanatory payoff relative to intention-based explanations.

adopt the group trait (because to be a member of that group is to instantiate that trait in some way). One example of a group trait in this sense could be a particular political system, such as representative democracy: to be part of a particular group which governs through representative democracy entails being part of a representative democracy (regardless of individual participation in particular political institutions). In this case the more successful group grows. Here we can assume that there is no production of offspring groups; instead the more successful group gets larger over time while the others either become extinct or diminish. However, this does not seem like a case where selection can explain cumulative adaptation. Any new ‘beneficial mutations’ (improvements on the trait responsible for the payoff difference) would be primarily explained through the within-group processes that spread the trait through the largest group rather than by between-group dynamics. This would look much more like differential growth than a selective process, with a parallel in the biological world to non-inherited changes to the phenotype of an organism during that organism’s lifetime.

These differential growth-like changes in the population of groups may have a role in explaining the distribution of observed phenotypes in a population at a given point in time, and may have fitness consequences. However, CGS itself would not explain the cumulative adaptation. A strong explanation for a complex group trait would likely lie somewhere else: for example, in a historical or anthropological explanation concerning the motives of powerful individuals, scaffolded by existing social norms. It may be true that the size of a group can be partially explained by its success, which has drawn individuals to switch group membership. Additionally, the size may be linked to its capacity to express a certain trait (for example, a system of division of labour which is only possible with a minimum number of individuals). However, I argue that it would be unnecessary to invoke the selection concept here. This does leave open the possibility of selective migration taking a minimal role, where the mere size of the group increases opportunities for novel traits to arise (even though the spread or persistence of traits cannot be explained by this process). This minimal role means that a kind of population-level thinking could be useful, and a partial explanation for the emergence of novel traits. However, it could not explain group adaptation.

Therefore, both selective imitation and selective migration seem to either, depending on how they are understood, rely on implausible idealisations in order to generate ‘interesting’, selection-like results, or fail to be the kinds of processes that provide distinctive explanatory benefits, over and above alternative intention-based approaches.

6. *Assessing Cases of CGS: Intergroup Competition*

I have highlighted the ways in which formal models of CGS processes fail as explanations of the spread of group-beneficial traits. Another part of the argument for the importance of CGS revolves around identifying cases where CGS is at work, and where a CGS explanation is critical to understanding population changes. Here, I focus on a case which has been taken to be a paradigm example of another CGS process, ‘intergroup competition’. Intergroup competition follows the structure of standard group selection closely, and so seems in principle capable of producing cumulative adaptation. However, a closer look at one of the cases cited as a key instance of CGS problematises the explanatory payoffs of CGS here, therefore giving us reason to doubt the scope of CGS explanations.

The CGS process that Richerson et al (2016) term ‘natural selection’ is variously referred to as ‘variation in extinction rates’ (Boyd and Richerson, 2010) or ‘intergroup competition’ (Richerson and Boyd, 2005). Here, the term ‘intergroup competition’ will be used, to avoid any confusion between this particular process and the usual, more general, usage of ‘natural selection’.

In its typical iteration, this process involves a population of groups competing for resources, with the more successful groups eventually outcompeting and replacing the less successful groups. Crucially, these groups are more successful due to cultural traits held by that group. For example, one group may hold a cultural norm that values individual self-sacrifice for the good of the group, and this means they are more successful in military conflicts with other groups. The replacement of less successful groups by more successful groups may come about through the extinction of the less successful groups, or through the assimilation of members of the less successful groups into the more successful group, who then adopt its norms. In both cases, the cultural traits of the successful group are spread throughout the population of groups.

This process is explicitly intended to resemble the form of group selection gestured at in some of Darwin’s theorising around altruism and morality, such as in the following passage from *The Descent of Man*:

...although a high standard of morality gives but a slight or no advantage to each individual man and his children over the other men in the same tribe, yet that an advancement in the standard of morality and an increase in the number of well-endowed men will certainly give an immense advantage of one tribe over another.
(Darwin, 1871, 159)

The process of Richerson and Boyd's 'intergroup competition', and the cases that they cite as examples of this process, are frequently framed with reference to the three conditions Darwin argued were necessary for adaptation by natural selection to occur: there must be a struggle for existence, variation amongst entities which means that some types are more likely to survive and reproduce than others, and this variation must be heritable (Boyd and Richerson, 2009).

The motivation for terming this process 'cultural group selection' appears to be as follows: firstly, it is 'cultural' in the sense that it is cultural, not genetic, traits that give one group an advantage over others, and these are the ones that selection acts on. This process is intended to be able to lead to the cumulative evolution of group-beneficial cultural traits, without any genetic change occurring. It is a selective process in the sense that there is competition between units, which results in some traits increasing in frequency and others decreasing in frequency over time. This selection occurs at the group level, rather than at any other level, because the target of explanation is the spread of group-beneficial traits, and it is groups that compete and grow, or become extinct (therefore, the group structure of the population drives the spread of group-beneficial traits). These traits could be distinctively group traits (such as certain social institutions), or they could be traits held by individuals that have group-beneficial effects.

This process meshes well with the intuitive conception of what a group selection process should look like, as taken from its use in biology. Intergroup competition seems to clearly be a selective process, that is able to act cumulatively and build adaptations, at least in principle. However, one of the key cases is not of this kind, and we have reason to think that 'paradigm' cases of intergroup competition are relatively rare. I will consider the case of the Nuer and Dinka, which is often cited as a key example of intergroup competition. I argue that anthropological evidence casts doubt on the CGS account of the interactions between these two groups, and that this bears importantly on the plausibility of a CGS explanation

here. Additionally, even if we take the CGS account at face value, it nevertheless does not offer much explanatory power.

6.1. The Nuer and the Dinka

The case of competition between the Nuer and Dinka in 18th and 19th Century Sudan crops up again and again in the cultural group selection literature (Sober and Wilson, 1999; Boyd and Richerson, 1985, 1990, 1992, 2005, 2009, 2010; Richerson et al, 2016; Richerson and Henrich, 2012; Henrich and Boyd, 1998; Henrich and Henrich, 2006; Henrich, 2015; Bell et al, 2009; Zefferman and Mathew, 2015, to name a few). Henrich (2004, 29) describes it as “one of the best-documented cases of cultural group selection”. If any case is a paradigm example of cultural group selection, and intergroup competition in particular, it should be this one. However, I will argue that firstly, the anthropological evidence for the account given by cultural group selection proponents is, at best, mixed, and secondly, that even if we take this account at face value, the kind of selection that would be at play here is minimal and cannot provide much unique insight into the dynamics of this case.

The Nuer and Dinka are two large ethnolinguistic groups that have existed for hundreds of years and still exist today. These broad groupings themselves consist of many different communities which vary in dialect, norms, and practices, as well as degree of political independence or interdependence with other neighbouring groups.

According to the way this case is described by CGS proponents (e.g., Richerson and Boyd, 2005), the Nuer were more successful in military confrontations with the Dinka, which resulted in Nuer invasion of Dinka lands and assimilation of many Dinka into Nuer groups. It is claimed that both groups inhabited similar environments and possessed identical technology, and therefore we can assume that that the success of Nuer groups over the Dinka was the result of differences in culture, and in particular sets of group-beneficial cultural norms which gave the Nuer a selective advantage in these confrontations. Specifically, Nuer groups had higher brideprices compared to Dinka groups. These higher brideprices (of which the currency was cattle), meant that Nuer individuals had to keep larger herds. These larger herds meant that more cooperation was necessary between Nuer settlements, and this cooperation meant that they were able to mobilise larger political units during warfare. Therefore, Nuer beliefs, norms, and practices spread rapidly across the region, and Dinka beliefs, norms, and practices declined.

However, there are reasons to doubt this account. This description of the cause of the expansion of the Nuer into Dinka territory (differences in brideprice payments) is taken from the anthropologist Raymond C Kelly, in his book *The Nuer Conquest* (1985). However, Kelly's model was not supported by the available data, departs in significant ways from previous anthropological and ethnographic work, and was heavily influenced by reports from British colonial officials, who had a distorted view of the Nuer in particular.

In De Wolf's (1990) critique of Kelly, he draws on the available data to show that key assumptions of Kelly's model are unsupported. The statistics he gathers do not show that Nuer have higher cattle per capita, or that brideprice payments differ significantly between the two groups. Previous anthropological work pointed to the role of ecological factors as critical in explaining the pattern of invasion: at some point the Nuer emerged as a separate group from the Dinka, from the very centre of the region. This central area had the most extreme ecological conditions, including high levels of flooding in the wet season. These conditions, combined with population pressure, led to Nuer being driven to migrate out of their central location and towards the Eastern Dinka (Newcomer, 1972; Johnson, 1982).

This work has also highlighted the blurred boundaries between the groups, particularly before colonial rule. Southall (1976) indicates that individual communities of Dinka or Nuer varied (and still vary) widely within themselves, with Eastern Nuer being more similar to Eastern Dinka in many ways than to Western Nuer, for example. The extent to which various Nuer or Dinka groups considered themselves a single people until the colonial administration treated them as such is also unclear. Additionally, the norms and practices of the two groups have been deeply interconnected and show many similarities, due both to the emergence of the Nuer out of the Dinka, and the assimilation of the Dinka into Nuer groups. Rather than Nuer culture simply spreading across the region, the incorporation of Dinka into Nuer groups led to changes in cultural practices, such as rituals and religious practices. Furthermore, Southall suggests the name Naath (the name by which the Nuer call themselves) connotes 'those who raid' and Jaang (the word for Dinka in the Nuer language; the name the Dinka call themselves in Jieng) connotes 'those who are raided'. He sees the differentiation between the two as in part arising from the claiming of these identities as 'raider' or 'raided' in itself, rather than stark differences in cultural traits.

The simple story of the conquest of one defined ethnolinguistic group (the Dinka) by another (the Nuer) may itself be the product of narratives created and reinforced in service of colonial ends. Johnson (1981) lays out the ways in which Egyptian conquest and later British colonial rule originated and reproduced stereotypes of the Nuer as ‘usurpers’ of land, and ‘enslavers’ of the local population, which were fuelled by existing racist notions of African ‘savagery’. According to Johnson’s historical analysis, these stereotypes heavily influenced the anthropologist Evans-Pritchard’s seminal study on the two groups, as well as the anthropological work that built upon it. The colonial government forcibly separated the Nuer from the Dinka in the areas where Evans-Pritchard worked, thereby preventing him from observing the Nuer engaged in normal relationships with any neighbouring Dinka. As outlined by Johnson, Evans-Pritchard relied heavily on reports from government officials, and reports by European travellers such as Werne, d'Antonio, Lejean, Poncet, Petherick, Schweinfurth, and Casati, which emphasised warfare between the Nuer and Dinka, and the dominance of the Nuer over the Dinka. However, these reports are limited to a few areas of the overall Nuer territory, and represent a short span of Nuer history (about forty years), and therefore cannot be seen as a comprehensive survey of Nuer-Dinka relations. Furthermore, Evans-Pritchard appeared to have overlooked references of cooperation in these reports, in preference of the narrative common to nineteenth century accounts of Nuer victimisation of the Dinka. This also led to the underestimation of the impact of Dinka culture on Nuer practices and beliefs, and the discounting of the possibility that movement of Dinka into Nuer society had fundamentally altered the Nuer social system in any way.

These differences between the account recited in the CGS literature and what may be the ethnographic reality are not incidental to its use as a paradigm case, and a more nuanced description could not be just as easily substituted. In fact, these differences have important implications for the role of a CGS interpretation of this case. I will first consider the impact of reconceptualising the Nuer and Dinka as something other than two defined groups, and then turn to whether the evidence against a difference in brideprice payments has a critical impact on the explanatory force of the CGS account. I will then argue that, even if we take the CGS account at face value, it still lacks explanatory power.

If we accept that the Nuer and the Dinka pre-colonial oppression were not clearly defined ethnolinguistic groups with spatial and cultural boundaries, does that affect the plausibility of a CGS explanation? Palmer et al (1997) make the argument that CGS relies on the existence of the right kinds of groups, and that human groups at any level (whole cultures or

societies, clans, bands, or tribes) are not the kinds of groups that can factor into a selective process. At the level of the tribe, which is the level most relevant to this case, they argue that typically an individual's membership in a particular tribe is conditional and flexible, and decisions such as whether or not to assist a group in warfare are made by individuals. According to Palmer et al, this fluidity and flexibility makes the notion of the group as a unit of selection problematic. This certainly seems to apply to the Nuer and Dinka, where, for example, individual Dinka males would join Nuer raids (Southall, 1976).

Boyd and Richerson (2010) respond to this, claiming that groups need not be strongly bounded, individual-like entities, only that there are persistent cultural differences between groups and that these differences affect the group's competitive ability. However, the blurred boundaries between the Nuer and Dinka make establishing persistent cultural differences difficult. If the beliefs, norms and practices are shifting over time, it is not at all clear that Nuer beliefs, norms and practices spread across the region, at the expense of the Dinka ones.

Furthermore, we can call into question the extent to which cultural differences affected the Nuer's competitive ability. Does the evidence that there were no significant differences in brideprice payments affect our assessment of the CGS explanation? It would seem that on the face of it this does not matter. For example, we could substitute in the ecological pressures that some authors have pointed to as driving Nuer people to expand into the surrounding areas. However, I argue that the role of the brideprice payments is crucial to the extent to which the CGS explanation is compelling here. As argued previously, CGS explanations have force when explanations in terms of intent or agency fail. What seems neat or persuasive about the original CGS account is that we have a difference in brideprice leading (implicitly) *unintentionally* to greater alliances between households, which leads to military advantage. Here, cultural norms that were (presumably) not designed to provide military advantage end up being 'adaptive'. This is what makes the CGS account appear intuitively appealing: individual Nuer did not construct higher brideprice payments in order to attain greater military success, and yet this cultural trait had group-beneficial effects. Therefore, we can explain the distribution of an adaptive trait, the spread of which could not be explained through a goal-directed agent model.

If we construct an alternative explanation, where difficult ecological conditions lead Nuer people to strategise and intentionally adopt attitudes towards raiding, and develop political systems to ensure that they can successfully raid, and then enjoy success over people who do

not have raiding at the core of their belief system or identity (with those who do share this attitude intentionally joining the raider group when convenient), it is much less clear what the explanatory gains from a CGS account would be. In this state of affairs, an account which relies on intentionality, agency or goal-directness would explain the phenomena well: Nuer traits spread because Nuer people intentionally developed ways to succeed in conflicts with the Dinka. It is then unclear how a selection redescription would offer anything over and above such an account.

Given the anthropological and ethnographic evidence, we have serious reason to doubt the status of the Nuer and Dinka example as a paradigm case of intergroup competition. However, even if we take the CGS retelling of Kelly's model as read, we still face issues with the explanatory power of the CGS account. The Nuer and Dinka case under this account is not a case of cumulative adaptive evolution. Those who invoke it as an example of intergroup competition do not show the building up of complex traits cumulatively and gradually over time, as a result of many rounds of selection. Rather, this would only demonstrate the spread of aspects of Nuer culture at the expense of Dinka culture.

Selection here does not explain why certain traits originated or were developed in particular ways. In particular, it cannot explain the appearance of design without a designer: all the cultural traits of the Nuer or Dinka even under this account have originated in other ways, and only their distribution in the population can even in principle be explained by intergroup competition. If this is the only payoff, it is difficult to make a strong case for invoking selection here. As with the lobster-fishing case discussed in the previous chapter, we could lay out the sequence of events without applying selection terms, and without losing any explanatory power.

This case does not prove that intergroup competition cannot lead to cumulative cultural adaptation, or that this CGS process could not be an important explanatory force. However, it casts doubt on the existence of clear cases of CGS, where CGS constitutes a crucial part of the explanation of the spread of group-beneficial traits.

7. Conclusion

CGS has been proposed as a potentially powerful explanation for the problem of extensive human cooperation, as well as other kinds of phenomena, such as competition between firms, or the development of conservation institutions. However, I have argued that CGS, at least in terms of the processes that have been developed to date, has less scope and explanatory power than has been claimed.

I have highlighted three ways in which CGS processes seem to not offer clear explanatory benefits over intention-based accounts, giving us reason to doubt their plausibility and scope. CGS work is generally comprised of formal modelling work that tries to show that CGS processes can lead to the spread of group-beneficial traits, and the use of examples that purport to be cases of CGS.

However, we can see three themes emerging from this work. Firstly, the formal models of CGS processes (selective imitation and selective migration in particular) rely on certain idealisations of social learning mechanisms. It is these idealisations that are driving the results of the models, and once these do not hold, the models lack explanatory power. Given that these idealisations are implausible and likely not to hold in real life scenarios, we have reason to think that selective imitation and selective migration as formally modelled cannot be powerful explanations of cultural phenomena.

Secondly, if we construe these processes in a way that avoids reliance on these idealisations, we are left with processes that also lack explanatory power. It is unclear how these processes, as understood as concerning the spread of group traits, could yield explanatory gains beyond those of an intention-based account.

Lastly, intergroup competition constitutes a CGS process which could, in principle, drive cumulative adaptation and therefore be meaningfully explanatory. However, one key example, that of the Nuer and the Dinka in 18th and 19th Century Sudan, does not appear to be a good example of intergroup competition. The CGS account conflicts with the ethnographic record, and conflicts in ways that prevent the successful application of CGS to this case. Furthermore, even if we accept the CGS account as read, intergroup competition in this case only plays a minimal role in explaining the spread of group-beneficial traits.

Therefore, we should be cautious about the potential for CGS to be a powerful explanatory tool that can be applied to a large set of phenomena. Future work may still show CGS to be

useful in explaining aspects of cultural phenomena; the case of the spread of pro-social religions (Norenzayan et al, 2016) outlined in the previous chapter may be an example of this. However, we should be wary of taking the results of formal models of CGS, and the existence of superficially plausible case studies, as evidence of its explanatory value. As argued in this chapter, formal models of CGS rely on particular claims about social learning, and in particular the existence of widespread social learning biases. In the following chapter I will examine one key social learning bias in detail, prestige bias, arguing for skepticism regarding its plausibility, and comparing the explanatory payoffs of prestige bias to goal-directed agent explanations.

Chapter 4

Rethinking Prestige Bias

1. Introduction

Universal, or near-universal, social learning biases have been argued to be crucial in understanding how cultures evolve. According to the work of authors such as Robert Boyd, Peter Richerson, Joseph and Natalie Henrich, and Richard McElreath, there are various kinds of systematic cognitive biases that structure human social learning and therefore the transmission of behaviours, ideas, and other components of culture between individuals. This can affect patterns of cultural change and stasis on a population level, and have been proposed as key drivers of the cumulative cultural evolution that has enabled humans to thrive in a vast range of environments (Henrich, 2015).

Broadly, these biases are often understood as ‘rules of thumb’ regarding who to learn from, or what is learnt, which have evolved because of the high cost of individual learning (Boyd and Richerson, 1985; Boyd et al, 2011b; Henrich et al, 2008; Henrich and McElreath, 2003). Models have been constructed that indicate that facultative social learning, where individuals rely on social learning in some situations and individual learning in others, emerges as a dominant strategy when individual learning is costly, and social learning is cheap and accurate enough (Rendell et al, 2010). According to some cultural evolution proponents, social learning biases can increase the benefits of social learning (Henrich and Boyd, 1998; 2002). They do this by directing which variants are acquired or who the variants are acquired from, and thereby increasing the likelihood that the new cultural variant acquired will be adaptive for the learner.

Social learning biases are typically partitioned into three categories: content biases, frequency-dependent biases, and model biases (Boyd and Richerson, 1985). Content biases (or direct biases) are those that favour the acquisition of one cultural variant (which could be a behaviour, idea, practice, or norm, amongst other things) over another by an individual

because of characteristics of the variant itself (its content). Work done by Dan Sperber and colleagues on the existence of ‘cultural attractors’ can often be said to fall within the category of content biases (Sperber, 1996), although their understanding of what these biases constitute and how acquisition and transmission operates differs from work carried out by Boyd, Richerson and Henrich, and their students, who tend to focus on frequency-dependent and model biases.

Frequency-dependent biases are those that favour the acquisition of one cultural variant over another due to characteristics of the trait’s distribution in the population. The type of frequency-dependent bias that has received the most attention in the literature is conformist bias, where individuals are disproportionately more likely to copy variants that are present at a high frequency in the population (Henrich and Boyd, 1998; Efferson et al, 2008). Models of conformist bias have claimed to explain a range of cultural phenomena, such as the diffusion of innovations (Henrich, 2001).

Lastly, model biases are those that favour the acquisition of one cultural variant over another due to characteristics of the individual from whom the variant is acquired (the ‘model’). The type of model bias that has received the most focus and has been proposed as a key factor in cumulative cultural evolution, and is the focus of this chapter, is prestige bias. This is where learners are more likely to copy variants from ‘prestigious’ individuals (Jimenez and Mesoudi, 2019 provide a review of the prestige bias literature; claims for its importance for cultural evolution can be found in Mesoudi and Whiten, 2008; Richerson and Henrich, 2012). Other model biases include a bias towards copying individuals based on age, familiarity, or similarity to the learner in respects such as gender or ethnicity (Coussi-Korbel and Frigaszy, 1995; Laland, 2004; Barrett et al, 2017).

These social learning biases also play an important role in the cultural selection literature. The kinds of social learning biases already described often form the foundation of approaches that focus on cultural selection as a key force for understanding cumulative cultural change. For some authors, it is the set of universal social learning biases (conformist bias, prestige bias, etc) that has allowed cumulative cultural selection to take place, and therefore brought about adaptations that are key to our success as a species (e.g., Richerson and Boyd, 2005). For example, as highlighted in Chapter 3, conformist bias and prestige bias have been cited as important factors in maintaining low levels of within-group variation, and maintaining levels of between-group variation, that are necessary for cultural group selection to take place

(Henrich, 2004). Another example comes from Henrich (2015), who argues that conformist bias forms a crucial part of the explanation of why the series of steps to detoxify cassava emerged and spread throughout in some South American populations. As outlined in Chapter 2, conformist bias is integral to this explanation as the steps here are causally opaque, so those relying on individual learning would (supposedly) struggle to figure out the adaptive behaviour.

However, some doubt has been cast on the existence or prevalence of these biases. Lewens (2015) offers a critique of the conformist bias literature, arguing that some of the key assumptions made in conformist bias models are not supported by empirical evidence, and that there is a form of circularity in the way that empirical and theoretical evidence is used to construct explanations.

Similarly, I argue for skepticism about the existence and prevalence of prestige bias. Broadly speaking, prestige bias can be understood as a bias towards copying ‘prestigious’ individuals. What constitutes a prestigious individual is not always entirely clear, and not fully elaborated on in the literature. Intuitively, prestigious individuals are high-status (typically due to a high level of skill or success in a socially valued domain), are treated by others with respect and deference, and may receive tangible goods due to their status.

Theoretical models have purported to show the adaptive benefit of prestige bias. Several studies have claimed to demonstrate the existence of prestige bias in both children and adults, and to show prestige-biased transmission networks in small-scale societies (Chudek et al, 2012; Atkisson et al, 2012; Reyes-Garcia et al, 2008). As with conformist bias, prestige bias is an important component of cultural selection explanations. For example, Henrich and Henrich’s (2010) work on food taboos in Fiji characterises taboos surrounding eating certain marine species by pregnant and breastfeeding women as the result of prestige-biased learning. According to Henrich and Henrich, prestige-biased learning results in the spread of these beneficial food taboos, leading to population-level patterns of adaptation. These social learning biases can be culturally selected for in themselves, as if they generally lead to the copying of adaptive behaviour, individuals who have them will outcompete individuals who do not. Additionally, groups with higher proportions of individuals copying the adaptive behaviour will do better than groups who do not.

Prestige bias models have also been invoked as a tool for understanding the existence of prestige in itself, and as explanations for a range of cultural phenomena, including the existence of celebrities, and of so-called ‘prestige goods’, that advertise the status of a prestigious individual (Henrich, 2001; Plourde, 2008; Mesoudi, 2009). In sum, research into prestige bias, both theoretical and empirical, and into the application of prestige bias as an explanatory tool, forms a significant part of cultural evolution research more generally.

I argue that although the accounts of prestige bias given by cultural evolution researchers seem plausible or compelling on their face, they in fact entail a set of implausible commitments regarding the underlying cognition, how the bias operates, and how we should understand prestige. Once we relax these commitments, the prestige bias account loses explanatory value and struggles to offer anything distinctive over a naive, goal-directed agent account. In the following section I begin by summarising the main account of prestige bias developed in the literature (found in Henrich and Gil-White, 2001). In Section 3 I argue that the characterisation of prestige itself under prestige bias accounts and in empirical tests of prestige bias is in tension with a general understanding of prestige. The definition of prestige in empirical work is problematically pruned in a way which defers to the definition of prestige given by the prestige bias account, and this calls into question the status of this work as evidence of prestige bias. Additionally, the prestige bias account is committed to a particular view of the cognition underpinning the bias, and therefore to predictions regarding its flexibility and context-sensitivity. Both these considerations give us reason to question the explanatory value of a prestige bias account over a goal-directed agent account to explain patterns of apparent prestige-biased learning. I then make this comparison with a goal-directed agent account explicit in Section 4, drawing on two cases cited as evidence of prestige bias to argue that they do not clearly favour a prestige bias account over a goal-directed agent account. I conclude by considering the implications of this skeptical view of prestige bias for cultural evolution research in general.

2. An Account of Prestige Bias

Henrich and Gil-White (2001) set out an extensive account of prestige bias. Although other authors have proposed similar accounts (e.g., Richerson and Boyd, 2005), in addition to being the most comprehensive and detailed account, theirs has been explicitly cited and used as the basis for theoretical and empirical work (e.g., Bell, 2013; Cheng and Tracy, 2014; Chudek et

al, 2012; Reyes-Garcia et al, 2008; Atkisson et al, 2012). Therefore, in my analysis of prestige bias I will focus on their account.

They define prestige in contrast with dominance, and characterise it as unique to human societies. According to Henrich and Gil-White, dominance hierarchies are typical of chimpanzee societies (which do not display prestige¹⁶). In dominance hierarchies, subordinates exhibit submissive behaviours towards superiors, avoid superiors when possible, and occasionally make aggressive challenges to the rank ordering. Dominant individuals in these hierarchies ‘grandstand’ to display their dominance, which is maintained primarily through physical force, or threat of physical force. In contrast, in prestige hierarchies, subordinates will actively seek contact and interaction with superiors, and will spend sustained periods observing superiors. Prestigious individuals will not grandstand, and may even be self-deprecating and adopt non-dominant postures such as looking down. Henrich and Gil-White claim that human hierarchies are typically a mix of dominance and prestige.

The existence of prestige is supposedly puzzling on its face, in that individuals are paying ‘costs’ in terms of deference and perhaps material goods towards prestigious individuals, and therefore we would expect some kind of benefit for these individuals in order for this behaviour to be evolutionarily stable. Henrich and Gil-White argue for what they term the ‘information goods theory’. The key insight of this theory is to propose ‘information goods’ as the goods that deference-paying individuals are receiving, and which therefore stabilise prestige hierarchies in a population.

As they characterise it, prestige hierarchies will develop in populations with individuals that are already capable of ranking the relative skill of other members of the population, and of displaying deference selectively to certain chosen members. Individuals will have the ability to rank potential learning models according to sets of cues. These cues include the model’s perceived competence (in terms of their skill or knowledge in a certain domain), their perceived health (which may be an indirect indicator of success or skill), and similarity to the learner in key respects such as age or gender (which may increase the likelihood that the cultural variants the model holds will be adaptive for the learner to acquire). Individuals that can pick up on these cues and successfully use them to selectively copy from certain models in the population will stand to benefit, as they will be more able to acquire adaptive cultural

¹⁶ There is some evidence to suggest that chimpanzees do display prestige hierarchies (Horner et al, 2010). This is discussed in further detail in Section 3.

variants than through either individual learning (and at a lower cost than through individual learning) or ‘unguided variation’ (copying members of the population at random). In particular, individuals that can identify models with high levels of skill or knowledge in a valued domain (in the ancestral environment, this could have been hunting, foraging or knowledge of medicinal plants), and can copy the behaviour of these models, will have an adaptive advantage.

Typically, in ancestral environments, copying the behaviours of a chosen model requires perceptual access, and therefore requires the cooperation of the model themselves. For example, if novice hunters wish to learn from successful hunters, they would likely need to closely observe various behaviours and practices that successful hunters use, in order to accurately copy them. If it is the case that access to models is crucial, then successful or skilful individuals who many learners wish to copy would be able to control access and thereby copying opportunities (providing they cannot be coerced into supplying this information). Then, a system could develop whereby individuals seeking to learn from successful individuals (who it would be adaptive to copy from) pay them deference, accord them status, and provide material benefits (such as exceptions from certain restrictive community norms), in return for access and the opportunity to observe their behaviours.

Eventually, in the population there will be a distribution of deference, where the most successful or skilful individuals will have many learners paying them deference (and therefore conferring ‘prestige’ upon them). When this happens, new individuals who are deciding who to learn from can decide based upon the level of deference (i.e., identifying the most prestigious individuals), rather than making assessments of skill or knowledge directly. This is supposedly adaptive because we would expect it to be significantly easier in many cases to identify the most prestigious individuals, rather than identifying them based on their skill or knowledge level. For example, who is the best hunter may be difficult to determine quickly or simply, given that there can be high levels of day-to-day variance in hunting returns, and even the best hunters can go through sustained periods without successful large kills. Rather than waiting to collect and compare data on hunting prowess, a novice hunter could simply use the ‘low-cost cue’ of who is the most prestigious hunter in the group (i.e., who is paid the most deference, and observed the most, by others), in order to determine who to copy.

Henrich and Gil-White argue that this kind of scenario is typical in human history: individuals who were able to pick up on deference or prestige cues and use them to selectively

copy models would have had an adaptive advantage within their group, and therefore prestige bias would have been selected for.

Henrich and Gil-White describe the development of prestige bias as potentially resulting in a kind of prestige ‘market’, arising from the differing interests of learners and models. Learners are seeking to copy the most successful or skilful models, whilst models have an interest in acquiring learners in order to receive deference benefits. This may mean that there is competition, where models compete to attract learners. If there is competition, models have an incentive to be ‘nicer’ in order to attract more learners. They use this to explain supposed ‘subdominant ethology’ found in some high-status individuals (such as self-deprecation, deep bows and lowered heads).

However, for learners (who Henrich and Gil-White term ‘clients’), the benefits of access to a model rapidly diminish with increasing ‘clientele’ size, as there is less individual attention paid to learners and therefore a lower likelihood of learners successfully acquiring the most adaptive cultural variants. Therefore, learners may prefer to copy less popular (and lower quality) models, who have lower ‘prices’ of access. Similarly, there may be a limit to how many learners a model wishes to attract (there may be an optimal ‘clientele’ size). It is possible this was followed by gene-culture coevolution, whereby, once prestige bias is prevalent and adaptive, genes that aid the reliable expression of prestige bias are selected for and spread.

3. Assessing Prestige Bias Explanations

Although the evolutionary story that Henrich and Gil-White offer seems plausible on its face, particularly when brought to life with examples of modern-day prestigious individuals and their influence, when we dig deeper we see that in order for the prestige bias account to have explanatory force, it entails a set of particular commitments, for which the empirical evidence is mixed. These commitments matter: once we relax them, it becomes difficult to make the case for the explanatory power of prestige bias accounts over, for example, a naive goal-directed agent explanation.

I will highlight issues that fall into two broad themes: firstly, that empirical evidence in support of prestige bias uses a concept of prestige that is pruned in deference to prestige bias

theory, in a way which casts doubt upon the extent to which this work constitutes evidence in support of prestige bias, and secondly, that the prestige bias account entails particular commitments regarding the cognitive basis of prestige bias, and the extent to which it will be flexible and sensitive to context. Both these themes have a direct impact on the comparison between a prestige bias account and a goal-directed agent account. This comparison will be drawn explicitly in Section 4.

3.1. Characterising Prestige

The first key problem with the prestige bias account concerns the vagueness regarding how the concept of prestige is understood. Precisely what prestige is comprised of is not fully characterised in Henrich and Gil-White's account, or indeed in other accounts of prestige bias. This is important to note, particularly when considering the evidence from empirical studies which use various proxies for prestige. There appears to be a disconnect between how prestige is understood within the Henrich and Gil-White account, how prestige is understood in general usage, and how prestige is operationalised in empirical work on prestige bias. In particular, the definition of prestige used in empirical work is often pruned in deference to the prestige bias account itself, calling into question the extent to which these studies can be used as evidence of prestige bias.

Henrich and Gil-White give a tentative 'ethology' of prestige, where they describe prestigious individuals as in control of the time spent with 'subordinates', having a free posture without grandstanding or violent gestures, and appearing confident yet self-deprecating. This is drawn in explicit contrast to dominance, where individuals rely on aggression and threat of physical force to maintain their rank. However, this is not comprehensive in that many individuals in a society may display these kinds of behaviours, without being regarded as 'prestigious'. By this I mean that there are many individuals, at least in modern societies, that do not display either dominant (aggressive) behaviours, or subordinate (threatened or submissive) behaviours. They may project confidence in their interactions with others, and be in control of who they spend their time with, and yet not enjoy the status benefits we typically associate with prestige (and will not be named as prestigious by others). In fact, the observed behaviours of prestigious people may not differ from less prestigious people in any systematic way, other than that the behaviour of others may be modulated in the presence of people they consider prestigious.

Additionally, it is unclear to what extent their use of the term ‘prestigious’ lines up with the common usage of the term. As already outlined, they use the example of Stephen Hawking as a prestigious individual in modern-day society (which would line up with our common sense notions of prestige). However, the common-sense notion of a prestigious individual does not require that many people are looking to copy their behaviours or ideas.

In Henrich and Gil-White’s evolutionary story, the most prestigious individuals are the individuals that most learners are seeking to copy. Even if prestige bias in modern-day societies operates differently than in ancestral environments, we would still minimally expect prestige bias to drive individuals to seek contact or opportunities for observation with prestigious models, and to be driven to preferentially copy them. It is therefore unclear whether the key component of prestige is deference from others and conferring of status onto prestigious individuals, or the seeking of prolonged access to and opportunities to copy from prestigious individuals from learners. We may expect these to often come apart.

The lack of a consistent conception or definition of prestige becomes a pressing issue when assessing the empirical evidence for the existence of prestige bias. In a 2012 study by Chudek et al, the ‘prestigious’ model was the one which was observed by two other individuals, while the other was not. Their measure of prestige is simply that other individuals are observing the model. Presumably this measure is chosen because of its relationship to the operation of prestige as described in the evolutionary origins story of Henrich and Gil-White: the number of people observing a model (and therefore paying deference benefits for access) was the low-cost cue that new learners could use. However, this appears to significantly differ from both common-sense notions of prestige, the identification of prestigious individuals in studies based in real world networks, and several examples or potential applications given in theoretical work. This is a problem for the status of these studies as evidence for Henrich and Gil-White’s account. This is because Henrich and Gil-White are making a particular claim: that prestige arose (understood broadly as the paying of deference benefits) due to the adaptive advantage of copying successful individuals. If these studies define prestige just as the tendency to copy, without measuring other aspects of prestige (i.e., the paying of deference benefits), then we are presupposing one of the key claims of the account.

A similar definition of prestige is used in a study by Atkisson et al (2012), where participants were tasked to ‘design’ an arrowhead on a computer, with the opportunity to modify their design based on arrowheads which were presented alongside information regarding the

‘prestige’ of the individuals that designed them. Here prestige was represented by the time that four individuals spent examining the given arrowhead (generated randomly by the computer), where arrowheads designed by more prestigious individuals were examined by others for longer periods of time. In both the Chudek et al and Atkisson et al study, prestige is defined in a way that presupposes the concept of prestige given in Henrich and Gil-White’s account. To make use of an analogy, this is as if we are seeking to test the connection between depression and lower serotonin levels, and in our test we define depression as lower serotonin levels. We can therefore question the extent to which studies which define prestige in this way are in fact evidential support for Henrich and Gil-White’s account of prestige bias.

A study by Acerbi and Tehrani (2018) did use a definition of prestige which is congruent with our general notion of prestige, in their test of the relative role of content versus context biases in the selection of quotations. Quotations varied in their content, and also in their context (either by being associated with a popularity score, measuring conformist bias, or in the prestige of the individual they were attributed to, measuring prestige bias). Individuals were then asked to choose their preferred quote. They measured prestige by attributing quotes to either a famous individual (i.e., one we would generally consider prestigious), or to an unknown author. However, they did not find a statistically significant preference for quotes by more prestigious individuals.

Therefore, there appear to be, broadly, two definitions of prestige operating in the literature. There is the one found in much of the theoretical work, and in studies in small-scale societies, where prestige typically involves acknowledged success or skill in a given domain or domains, the payment of deference and of status-related goods. This may or may not coincide with other individuals seeking to observe and spend time with prestigious individuals, and seeking to copy their behaviours. Alternatively, there is the operative definition of prestige used in lab-based studies, which focuses around the number of individuals that observe a model. This can occur without any of the characteristics associated with prestige in the first sense.

3.2. The Cognitive Basis of Prestige Bias

In addition to the tension between definitions of prestige which affect our assessment of the empirical evidence for prestige bias, I will argue that prestige bias as understood by Henrich

and Gil-White is dependent on a particular understanding of social learning biases as unconscious or not amenable to reflective consideration.

There are broadly two ways to understand what ‘prestige bias’ refers to. The first is on a purely populational level, where we see a pattern towards copying the behaviours of more prestigious people, with no commitment to how this bias is realised on a cognitive level. The bias could be the product of intelligent reasoning and conscious thought, it could be implicit and automatic, it could have an affective dimension, or not. The second way is to place constraints on what this bias entails: for example, understanding it as a subpersonal, automatic, implicit process (which has implications for how it operates). Here, I will argue that, while it is tempting to take a populational view that avoids specific cognitive commitments, the explanatory value of prestige bias explanations is in part determined by what kind of cognitive processes the bias is constituted by.

Cecilia Heyes, in her 2018 book *Cognitive Gadgets: The Cultural Evolution of Thinking*, outlines two ways to conceptualise the mechanisms that make social learning selective (i.e. that give rise to biases such as prestige bias): the ‘strategic’ approach and the ‘attentional’ approach. The strategic approach implies that the selectivity occurs at the output stage: in the case of prestige bias, if an observer is exposed to two models performing different actions (one more prestigious than the other), she will encode both inputs, and then when confronted with a situation where she has to make a decision about which action to choose, she is more likely to choose the action performed by the prestigious individual. In this approach, the agent “uses” a strategy, which Heyes believes implies that this depends on reportable, high-level processes, rather than low-level, automatic processes. In contrast, the attentional approach asserts that selection occurs at the point of information reception: if an observer is exposed to two models performing different actions (one more prestigious than the other), she will attend more closely to the more prestigious model, and therefore will learn more about this action than the other. In this case the bias is due to the modulation of learning by low-level or automatic attentional processes, rather than the application of an explicit rule.

Heyes argues that those who adopt the strategic approach tend to assume that these domain-specific, high-order selective social learning bias are genetically inherited, and see prestige bias as a ‘cognitive instinct’. She argues that it is in fact preferable to understand these kinds of social learning biases as what she terms ‘cognitive gadgets’, or metacognitive rules or strategies. These metacognitive strategies are likely to be culturally rather than genetically

inherited, transmitted with fidelity and accuracy through training and socialisation, and may take highly domain-specific forms (such as the role ‘copy the boat builder with the largest fleet’). She claims that, while the attentional approach is plausible for a lot of social learning, especially in non-human species, the kind of social learning biases that make humans uniquely capable of cumulative culture involve this kind of metacognition.

If we understand prestige bias as implicit and automatic (or as a domain-general, attentional process), then the value of a ‘prestige bias’ explanation over a general ‘goal-directed agent’ explanation is evident. Not only do they differ in the cognitive details (prestige bias is subpersonal, not available to conscious deliberation and rational reflection), but they would also clearly differ in their predictions. For example, an individual with prestige bias would show a tendency to copy the behaviours of a prestigious individual even in situations where skill did not correlate with prestige, and where copying the behaviour would not be an effective way of harnessing expertise. We would expect less flexibility, and less ability for individuals to reflect on and report on these biases. The differences in the explanatory capacity of these accounts will be elaborated on in the following section.

However, if we understand prestige bias using the metacognitive approach, things become less clear. To take Heyes’ example of a metacognitive rule, ‘copy the boat builder with the largest fleet’, it is unclear how we would distinguish cognition and behaviour based on such a ‘rule’, compared to the intervention of general intelligence. For example, an individual may, upon conscious deliberation, decide that the copying the boat builder with the largest fleet is what is most likely to enable them to build the best boat. This may not be the same strategy they follow when building something else, and this strategy may change depending on circumstances. If this is the case, then it is not clear what the advantage is of conceptualising these behaviours as ‘rule’ or ‘strategy’-following. Heyes’ examples include the boat-builder, and ‘copy digital natives’ (i.e., copy those that we judge to have digital expertise). We could think of similar rules for any kind of human decision-making, such as ‘copy the writing style of successful academics’. However, it is unclear that this constitutes a plausible reflection of human cognition. Heyes gives us no reason to identify certain behaviours as rule-following, and as examples of culturally evolved ‘cognitive gadgets’, over others.

Precisely what kinds of cognition underlie these biases matters. It matters because it will change the predictions of prestige bias explanations, which will either lie in contrast to or bear more similarities to rational agent type explanations. An approach that remains agnostic

to the cognitive underpinnings loses explanatory value. Imagine it were the case that we could understand individual behaviours just as well using a goal-directed agent type approach, understanding decisions through the goals and limitations of individual agents, but when seen from a populational level, a prestige bias pattern emerges (it is often effective to copy the most prestigious people). We could term this a prestige bias, but we would lose what is distinctive from the existing accounts. We would lose the adaptive explanation for the emergence of prestige hierarchies, and an explanation for prestige that does not rely on general intelligence. It would be unclear why we should see prestige bias as an interesting explanation for behaviour, even if a pattern emerges at the populational level.¹⁷

3.3. *The Context-Sensitivity of Prestige Bias*

Following from this, understanding prestige bias as an unconscious or implicit social learning rule results in certain predictions about how prestige bias operates. These predictions are crucial to the explanatory value of prestige bias. If prestige bias is highly context-sensitive and reliant on complex and shifting calculations carried out by individuals regarding who best to learn from, it becomes increasingly difficult to separate out its predictions from a goal-directed agent account. Lewens (2015), in his assessment of conformist bias, highlights the need for conformist bias to not simply be a tendency to copy the most common traits, but be a tendency for individuals to *disproportionately* copy the most common traits in a group. In the case of prestige bias, learners should be biased towards copying prestigious people over and above what we would expect from a general account of individuals as goal-directed agents. In an extreme case, if learners reason that in certain contexts prestige would be a useful cue, and deploy it only when they believe it to be beneficial, and are able to articulate why they are relying on it in these cases, a prestige bias account would not offer anything distinctive over a goal-directed account. This would not support Henrich and Gil-White's particular evolutionary story, and call into question why we should understand population-level patterns of prestige-biased learning, if they exist, in terms of individuals holding this specific social learning bias, rather than the result of rational, reflective, goal-directed action.

¹⁷ There is a parallel here with conformist bias, where we might see similar population-level patterns emerging when individuals evaluate the payoffs of adopting certain traits versus adopting them due to implicit and automatic conformist bias (Lewens, 2015).

Therefore, the explanatory value of prestige bias accounts is dependent upon the extent to which the tendency for learners to copy prestigious individuals is the result of reflective deliberation or goal-directed intent. One indication of this is the extent to which prestige bias exhibits cross-domain action. By this I mean that when learners copy the behaviour of prestigious individuals, they copy their behaviour in many respects, not a very limited subset of behaviours that are directly responsible for adaptive outcomes.

The evolution of prestige bias is based on prestige as a low-cost cue for who is best to copy. In this scenario, it would be too costly (in terms of time, material resources, or potential for error), or difficult, to directly discern which behaviours are adaptive and copy these, rather than gaining prolonged access to a model in order to copy many behaviours. If individuals were able to hone in on the behaviours of successful models that are responsible for their success, then presumably cooperation of the model in providing proximity and interaction would play a far smaller role. Additionally, if learners are copying the adaptive behaviours prestigious individuals only in cases when it would be adaptive to do so, this behaviour could be explained by a goal-directed agent account. It would therefore be difficult to see the explanatory gains from positing prestige bias in particular to explain these phenomena.

At least in modern-day societies, it does not seem to be the case that individuals copy suites of behaviours and practices from the most prestigious individuals. We can see this more clearly by looking at some of the examples used. In the prestige bias literature, we find a mix of informal and formal examples. One often invoked example is the existence of celebrities. Authors frequently gesture at the ability for prestige bias to explain why people in modern-day societies have a tendency to copy the clothing choices of celebrities, amongst other things (e.g., Henrich, 2001; Mesoudi, 2009; Jiménez and Mesoudi, 2019). However, prestige bias seems to be an ill-fitting explanation for this phenomenon in two ways. Firstly, many prestigious individuals are deferred to and given prestige by others who do not wish to copy them. Henrich and Gil-White offer the example of Stephen Hawking as a prestigious individual. However, Stephen Hawking was regarded as ‘prestigious’ by a large number of people (who may well have paid him deference and other benefits of prestige), whilst we might imagine that only a very small number of people would be looking to copy his behaviours or ideas (most broadly, physicists). Secondly, celebrities who are copied are often strikingly *not* copied in domains that are responsible for their success. For example, many individuals might copy the style choices of Odell Beckham Jnr, with no intention of trying to copy his American football skills, or the make-up of Kylie Jenner, without copying her

business practices. If prestige bias is an unconscious or implicit bias towards copying prestigious people where learners cannot discern which behaviours are responsible for success, we would expect learners to copy all (or a large set of) the behaviours of a prestigious individual. In our evolutionary history, if prestige-biased learners selectively copied the non-adaptive traits of prestigious individuals whilst not copying the adaptive traits, prestige bias would not have been adaptive and would not have been culturally selected for.

Although it is outside the scope of this chapter to defend a particular alternative explanation here, one possible explanation of the existence of prestigious individuals who are not generally copied from (such as Stephen Hawking) might be through a process of rational reflection. For example, individuals might value traits such as intelligence, and afford respect to those who they perceive as exemplifying these traits. Additionally, individuals may copy the style of someone like Kylie Jenner due to (in part) biologically and socially shaped aesthetic preferences. It is difficult to see how positing prestige bias explains features of the influence of celebrities in a way that intention-centred explanations cannot.

In fact, empirical studies have found mixed evidence for the cross-domain action of prestige bias. The Chudek et al (2012) study previously discussed claimed to find evidence of prestige-biased learning in children. In these studies they showed groups of children (around 4 years old) two adult female ‘models’ performing a series of actions. Firstly, they were shown the models making a choice between two objects. One model was being observed by two other individuals, who were not interacting with the model or each other, only gazing at the model (the ‘prestigious’ model). The other model was not being observed. Then, they were shown the same two models making a series of preferences: for example, picking toy A over toy B, or biscuit A over biscuit B. They were then given the opportunity to make choices between the two options themselves. They found that children were more likely to copy the choice of the ‘prestigious’ model, although this was significant for some domains and not others (in one study, for artifacts, but not for food or drink preferences, and in another, only for the domain that prestige was cued in).

Studies in small-scale societies have also found differences in the relevance of prestige in different domains, as well as the connection between prestige and age. Reyes-Garcia et al (2008) studied connections between ethnomedicinal plant knowledge and prestige within an Amazonian group called the Tsimane’, and did not find a clear association between such plant knowledge and level of prestige, and no association between prestige and age. Another

study in Fijian villages examined success, knowledge, and model selection for three socially valued domains: fishing, yam-growing, and medicinal plant use (Henrich and Broesch, 2011). Success in fishing and yam-growing were far better predictors of prestige than ethnomedicinal plant knowledge. Additionally, they only found age to be a predictor of model selection for some domains in some samples, and individuals were more likely to select models of the opposite gender to their own. Prestige bias models predict that older individuals are more likely to be copied and to have prestige, due to an average increase in skill and knowledge, and that same-gender individuals are more likely to be copied (in a society where what constitutes adaptive behaviours differs between genders).

Brand and Mesoudi (2019) found similar indications that prestige may be domain-specific. They investigated prestige and dominance hierarchies in groups of adults who had pre-existing relationships (they were members of established community groups, rather than participants placed into a new group for the purpose of a study). In their study, the prestige ratings of an individual given by their group members did not predict that individual's performance on the group task they were set, or who was selected to represent the group for a bonus task. The selection of the group representative was based not on perceived prestige or dominance, but correlated with the individual's actual performance in the group task.¹⁸ This potential domain-specificity of prestige-biased learning, or who is accorded prestige, matters for the assessment of prestige bias as an explanation. If prestige-biased learning is highly domain-specific, this becomes easier to explain in terms of the goal-directedness of agents: individuals may be evaluating when it is appropriate to rely on prestige cues, and when it is not.

Jiménez and Mesoudi (2019) in their review of the prestige bias literature, note the mixed evidence for the specific predictions of the Henrich and Gil-White model. Given this, they suggest modifications to these predictions. These modifications include restricting the presence of prestige bias to cases where the domain of prestige is currently valued for a social group, where individuals carry out tasks which are domain-relevant and difficult, when the variation in knowledge and skill is large, and when prestige is highly correlated with success. Although these modifications bring the prestige bias account further into agreement with the empirical evidence, it does so at the expense of explanatory power. If prestige bias is no

¹⁸ Additionally, Jiménez and Mesoudi (preprint) tested the effects of prestige on the transmission of information. A prestige bias account would predict that information from more prestigious people would be more accurately recalled and transmitted. They did not find evidence for the effect of prestige on information transmission.

longer a general ‘rule-of-thumb’, deployed implicitly and unconsciously, biasing social learning in clear and systematic ways, but rather a highly context-dependent phenomenon that relies on individuals having access to large amounts of social information, it becomes more difficult to make the case that prestige bias offers explanatory benefits that a goal-directed agent account does not.

However, there is empirical work which does appear to suggest a prestige bias account over a goal-directed account. Firstly, evidence of overimitation, where people have a tendency to copy irrelevant actions carried out by prestigious individuals, is suggestive of a systematic bias that is not easily explained through intentional behaviour. McGuigan (2013) carried out a study in children that showed that they were more likely to overimitate when copying high social rank models than low social rank models. However, a study by Chudek et al (2016) found the opposite result: no difference in the propensity to overimitate high versus low status models. Secondly, cases where individuals were not consciously aware of the effect of prestige in deciding who to learn from would speak in favour of prestige bias, as an unconscious or implicit bias, over a simple goal-directed account. Priestley and Mesoudi (2015) found that users of the social media website Reddit ranked ‘social influence’ low on the factors that drove them to ‘upvote’ or ‘downvote’ content. However, as they note, previous work has suggested that artificially adding ‘upvotes’ (which could be construed as a measure of social influence) significantly increased the chance of further ‘upvotes’ (Muchnik et al, 2013). If this is indicative of a broader pattern whereby individuals are not aware they are acting in a prestige-biased manner, this would support the prestige bias account over a goal-directed or intention-based explanation. Further work is needed to determine the extent to which prestige-biased patterns of learning are flexible and context-sensitive, and individuals are aware of the drivers of their decision-making.

3.4 Unique to Humans?

One final concern for the prestige bias account is the evidence for prestige dynamics in non-human animals. Prestige-biased learning is based on copying, and imitation in particular, and therefore is presented as uniquely human by Henrich and Gil-White. In particular, prestige-biased learning is presented as one of the mechanisms that enables cumulative cultural evolution, which has allowed for the production of sophisticated cultures and behaviours that have allowed the colonisation of a large range of environments, and the vast success of our species, in a way that sets us apart from other species (Henrich, 2015). However, although

chimpanzees are generally thought to lack the capacity for imitation, and for cumulative culture, there is evidence that they demonstrate a preference to follow the behaviours of older, high ranking individuals with a history of success in a similar context (Horner et al, 2010). Evidence of prestige in non-human animals gives us reason to doubt the specific adaptive story proposed by Henrich and Gil-White (and adopted by others).

4. Goal-Directedness: An Alternative Explanation

The main alternative theory for prestige that Henrich and Gil-White consider is the ‘tangible goods theory’. This is still an evolutionary model, which supposes that prestigious individuals offer tangible goods in return for deference. For example, individuals who have acquired more assets and resources would be able to exchange these for deference and status benefits. This would not give rise to prestige-biased learning per se, but would likely give rise to abilities to rank others in terms of tangible goods to exchange, and the ability to selectively defer to these individuals when it is beneficial.

In this section I will introduce another alternative, which I term the ‘goal-directed agent account’. I argue that, upon close examination, it is unclear that the prestige bias model represents an increase in explanatory power over this naive, or common-sense model.

A goal-directed agent account explains the behaviours of individuals through their status as intentional agents, acting in pursuit of their goals, where those actions are relative to their epistemic limitations and the social landscape. This does not necessarily mean that the preferences or choices of individuals will always be the adaptive optimum; there are many factors that may circumscribe or shape choices. This could also be characterised as a ‘common-sense’ view of individuals as agents, where individuals’ actions can be understood in terms of pursuit of their goals. Under this account, individual would partake in a process of general evaluation of various relevant factors, that would be flexible and context-dependent.

The motivation for developing kinds of cultural evolution models frequently stems from the drive to explain phenomena that seem difficult to explain through a standard view of humans as goal-directed agents. If some phenomena could in fact be adequately captured in this way, it would significantly diminish the explanatory potential of many kinds of cultural evolution explanations. In the context of a critique of the memetics project, Greenberg (2004) draws a

contrast between memetics explanations and a ‘commonsensical’ account of cultural change that sees individuals as in “deliberate pursuit of [their] conscious goals”. He points out that meme theory needs to offer a distinctive explanation of why ideas spread, which competes with and contributes something beyond a common-sense goal-based account. A similar situation applies to other cultural evolutionary approaches. This is an issue because the onus is on cultural evolution approaches to show their distinctive explanatory value: ‘rational agent’ type explanations are so widespread, demonstrably effective in many domains, including our daily lives and common-sense understanding of others, that it is unclear why we should shift to a less intuitive framework that downplays human agency, if there is not a clear case made for its increased explanatory or predictive power.

It is for these reasons that I choose to contrast prestige bias explanations with ‘goal-directed agent’ explanations, to tease out their explanatory potential. This is not intended as an argument for a simplistic, goal-directed agent explanation as the best explanation for certain phenomena; other possible competing explanations could make reference to social or institutional structures, or genetically encoded aspects of cognition. However, if prestige bias explanations cannot offer anything distinctive over a common-sense, intuitive, everyday understanding of the behaviour of others, it would cast their usefulness into doubt.

To illustrate how these explanations would differ, here I elaborate on an example given by Atkisson et al (2012) to represent prestige bias. This example is of a woman who marries into a new community, with different specialisations than the community she grew up in, and where the women are responsible for making stone arrowheads.

i. Prestige bias explanation

The new prestige-biased learner looks around and determines who the most prestigious arrowhead maker is in the group (defined by Atkisson et al as the person that everybody pays the most attention to). She then pays the cost of access in terms of deference, and copies the behaviours of this arrowhead maker. If the costs are too high, she may choose a less prestigious model with lower costs of access.

ii. Rational agent explanation

The new learner considers various factors in pursuit of her goal to make good arrowheads. She may consult friends in the group, explore through individual learning, or try to observe more successful arrowhead makers. If she pays deference to the most prestigious arrowhead maker, this could be (for example) because of a conscious calculation that deference is necessary in order to obtain the information she would like, or because she feels admiration for the prestigious arrowhead maker (which could occur whether or not she copies this individual), or because of the desire to conform to social norms.

The rational agent model may give the same predictions as the prestige bias model in some cases, and may depart in others. However, even when the predictions are the same, the rational agent model cleaves to how we typically understand individuals' actions and has high *prima facie* plausibility, so the onus is on prestige bias models to provide explanations that improve on this in some way.

4.1 Comparing Predictions

The main advantages of prestige bias models, as outlined by Henrich and Gil-White, appear to be in explaining the existence of prestige hierarchies in human societies in the first place, and in making particular predictions. These include that individuals will seek contact with prestigious individuals, will copy them, and pay deference to them, and that prestigious individuals will be highly skilled and successful, and be able to maintain their status without aggression or dominant behaviour.

They may be correct in asserting that the tangible goods theory struggles to explain why people show deference even when individuals stop producing tangible exchangeable goods, why they copy their behaviours and opinions, and why the dynamics of human social status rankings seem to differ from those of other social species. However, prestige bias models face similar explanatory challenges. As outlined in the previous section, the prestige bias model is committed to several, likely implausible, assumptions. Prestige bias accounts either need or expect prestige to have been initially adaptive, to involve a form of copying, and for this copying occur across domains. A goal-directed agent account requires none of these assumptions.

Is it possible to adequately explain the existence of prestige in itself without invoking prestige bias? Prestige bias models do give a compelling story for why prestige would have evolved in the first place. However, prestige could be explained through other means. For example, people generally accord prestige to those they perceive to be highly skilled or knowledgeable (and, as already argued, not necessarily those they wish to copy). This could be understood as valuing the skills or knowledge of the other individual, and translating that into admiration or respect. Additionally, the influence that prestigious people often have could be understood as others judging them to be a good source of information or advice based on direct assessment of their skill or knowledge, rather than a bias to copy based on prestige alone.

A possible response to this is to invoke proximate versus ultimate considerations here. Could it not be the case that emotions such as admiration are proximate mechanisms by which prestige bias is realised? This is where it becomes important to clarify what the cognitive basis of this bias is, and whether this matters to prestige bias explanations. However, my intention here is to note that an explanation that does not rely on an adaptive basis to prestige, and instead (perhaps) understands it as a side-effect of our general capacities for intelligence and reasoning, is possible and plausible. Here, it is not clear that a prestige bias account gives us new resources to explain the existence of prestige.

I will consider two studies whose results have been interpreted as evidence for the existence of prestige bias, in light of both the prestige bias and the goal-directed agent account. I argue that neither of these studies provide convincing reasons to favour the prestige bias account over the goal-directed agent account.

4.2. Case 1: Building Arrowheads

One lab-based study purports to demonstrate prestige-biased learning in adults (Atkisson et al, 2012). In this study they sat participants at computers and asked them to ‘design’ an arrowhead, that could vary in several dimensions, and then would be used to go on ‘hunts’. The closer their design was to the hidden optimal design, the higher their payoff would be. They had a series of hunts, with an opportunity each time to improve their design either through individual or social learning. If they chose to learn ‘socially’, they were shown a choice of five arrowheads, and if they clicked on one, they were given information about ‘prestige’. This information was the names of four other individuals and the amount of time

these individuals spent examining the given arrowhead (generated randomly by the computer). They found that individuals were more likely to select an arrowhead that was more ‘prestigious’ (they were given information that people had looked at it for longer).

Of course, methodological issues can be found in most studies in any area. Additionally, with the necessarily atypical settings of any lab-based study there will always be questions about external validity. However, the issues that arise with these studies point to a deeper conceptual confusion in the prestige bias literature. As mentioned in the previous section, these studies often use proxies for prestige that may not adequately capture the concept as used in theoretical work.

The Atkisson et al study in particular represents prestige in an unusual way. The participants do not even have access to individuals to observe, rather they can only observe the arrowheads produced, and only have information on the length of time people spent looking at the arrowhead. This is very far from prestige as described in theoretical work, or as used in daily language. In fact, prestige bias supposedly arose in part because of the difficulty of gaining useful adaptive information directly from sources such as artefacts. If this were possible, continued access to prestigious people would be much less important. Here there is no deference component (there is no indication that individuals regard the makers of the arrowhead as prestigious, or act as such), and no opportunity to copy other behaviours other than the arrowhead design itself. Although this study may point to something interesting about the way in which we learn, it does not appear to provide evidence for prestige bias as constructed by cultural evolution authors, and as used in the development of cultural selection explanations amongst others.

If prestige bias is implicit, and automatic, we would expect it to be cued by signals such as the way that other individuals act around a prestigious person (i.e. deference). In the Atkisson et al study participants had access to information that had to be interpreted: they would have had to connect the written information that others were looking at an arrowhead to some internal conception of prestige, where prestige is not directed towards an identified individual, but is rather routed through the product of (presumably) someone’s labour (the arrowhead). This seems to be consistent with a deliberative, conscious process of reasoning, where these connections can be made.

It is therefore hard to separate a prestige bias explanation here from a goal-directed agent explanation, as the influence of conscious and deliberative processes seems clear.

Alternatively, these results could even be construed to support another social learning bias: conformist bias. The information that others were looking at the arrowhead could have been interpreted as other individuals also choosing that arrowhead, and therefore we could tell a story of a bias towards choosing the arrowhead that others were choosing. There are likely to be issues with this interpretation also, however, I mention it to point out that the existence of a given social learning bias here is severely underdetermined by this empirical work.

Furthermore, this issue is not confined to the limitations of Atkisson et al's study: Acerbi et al (2016) carried out modelling work to show that population-level patterns that have been taken as evidence of conformist transmission can be produced in the absence of conformist bias, such as with the existence of model biases such as prestige bias, content biases, or without positing a particular social learning bias. We should therefore be cautious about taking the existence of population-level patterns consistent with prestige-biased learning as evidence of prestige bias itself.

4.3. Case 2: The Evolution of Food Taboos

Henrich and Henrich (2010) carried out a study which they characterise as a case of prestige-biased transmission. They aim to show that social learning can give rise to 'culturally evolved adaptations', and they do this through examination of a population of pregnant women in Fiji. The story they tell is that in Fiji, there are certain marine species that carry a high risk of toxins that cause food poisoning, with particularly dangerous effects for foetuses and nursing infants. In the Fijian population, there exist food taboos for pregnant and breast-feeding women surrounding these particular species, which cause them to remove those species completely from their diet. Pregnant and breast-feeding women 'acquire' these taboos both from close female relatives and from a small number of women in the population who are identified as being particular sources of knowledge on these taboos: 'yalewa vuku' or 'wise women'.

According to Henrich and Henrich, close female relatives are low-cost, accessible learning models who share fitness incentives with the learner. As defined by the authors, yalewa vuku are "women who are well-respected and considered knowledgeable about traditional medicine, birthing and childcare": these women are 'preferred models', and by selectively learning from them, learners can improve on the cultural variants acquired from their family members.

Over time, this tendency stabilises a population at an adaptive equilibrium. The ‘adaptive’ behaviour of avoiding toxic marine species is explained through patterns of biased transmission, likely built through rounds of previous genetic and cultural selection.

In order to clarify the explanatory merit of the prestige bias model, I wish to introduce a comparative example. Let us consider the following case:

A woman living in Cambridge becomes pregnant for the first time. As she is concerned for the health of her foetus, she wishes to avoid any behaviours that would affect its health during her pregnancy. She consults her mother, her family GP, and the NHS webpage on ‘foods to avoid during pregnancy’. When asked why she chose these sources of information, she explains that she wants to learn from the experiences of her mother, who has been through several pregnancies, and that she places trust in the expertise of her family GP and the recommendations of the NHS. After consulting these sources, she decides to avoid soft cheeses with white rinds, such as brie and camembert. This decision is beneficial, as these cheeses are known to contain listeria bacteria.

This case follows the same structure as the case of Fijian food taboos. Both cases involve the expression of an ‘adaptive’ behaviour (in that it promotes the health of the foetus), which is acquired through social learning. The individuals in question selectively learn from close female relatives and ‘preferred models’.

However, in the second case, a prestige bias model seems intuitively implausible or unnecessary. This is because a goal-directed agent-type explanation jumps out at us as being the most plausible and most explanatory. We can explain the Cambridge woman’s behaviour through standard goal-directed means. She is motivated to maximise the health of her foetus, and synthesises information from various sources to achieve her goal. She chooses these sources based on a variety of reasons, all within conscious control (i.e., the decisions can be understood without reference to automatic, subpersonal, or domain-general processes).

Given the similar structure of the Cambridge case to the Fiji case, we can also apply this rational agent explanation to the Fijian case. The Fijian women under study are motivated to maximise the health of their foetuses, and therefore consult a range of sources (family, and known experts) in order to determine the best course of action. What this shows is that

prestige bias models do not provide any explanatory advantage over common-sense goal-directed models in this case, with goal-directed models having higher *prima facie* plausibility.

These two cases are an indication that the evidence proposed in support of the existence of prestige bias can likely be equally as well explained by a simple goal-directed agent model. Therefore, it is difficult to make the case for understanding these aspects of social learning through this specific prestige bias account, which comes with implausible theoretical commitments.

5. Implications and Conclusion

I have argued here that we have reasons to doubt the plausibility and explanatory power of a prestige bias account. Differences in the definitions of prestige used in theoretical and empirical work cast doubt upon the status of the empirical evidence for prestige bias. Additionally, I have highlighted that prestige bias as an explanation depends on a particular view of the cognition underpinning the bias. This is associated with particular predictions about the bias as implicit, systematic, and not available to conscious reflection. Empirical evidence suggesting prestige-biased learning is flexible and context-sensitive causes us to question whether we should favour the prestige bias interpretation over a goal-directed agent explanation. Furthermore, modifying the predictions of the prestige bias account to bring them in line with the empirical evidence weakens their explanatory value. I have demonstrated the way in which a goal-directed agent account could explain some of the empirical evidence for prestige bias through explicit consideration of two cases, demonstrating that in these cases a goal-directed explanation may do just as well.

Social learning biases, and prestige bias in particular, form an important component of work into cultural selection processes. If there are reasons for skepticism about the existence of prestige bias, what consequences does this have for cultural selection models in general? I argue that, in fact, this does not have to have a significant negative impact on the plausibility of at least some cultural selection processes. To take the example of cultural group selection, prestige bias largely functions as a mechanism for minimising within-group variation and maintaining between-group variation (Henrich, 2004). If individuals are all copying the most prestigious individuals in a group, that increases the likelihood that most individuals in the group are expressing the same cultural variant. In this case, as long as there is some

mechanism for achieving this, it does not really matter whether it is prestige bias. For example, people could be learning in what looks like a prestige-biased pattern, without the existence of implicit, automatic biases towards prestigious individuals. In fact, everyone could be acting in a goal-directed way, explicable through a rational agent type explanation, and yet this still perpetuates enough within-group conformity for cultural group selection to take place. To return to the medical example, if everyone believes that their doctor is an important source of expertise, and doctors share the same opinions on, for example, what pregnant individuals should avoid, then we may well expect conformity within a group on tabooed foods during pregnancy.

However, there are still some important implications for cultural selectionists. Cultural selection explanations depend upon human intelligence or creativity factoring in to these explanations in a limited way. This is not to say that cultural selection cannot accommodate human intelligence, but rather, that the explanatory power of cultural selection explanations derives from their ability to give us understanding of how cultural patterns or traits accumulated and emerged without resorting to human ingenuity as the locus of explanation. Cultural selection explanations have appeal when applied to cases that seem unexplainable or poorly explained through intelligent individual decision-making. This is why social learning biases have formed such a key part of the cultural selection research programme: we can construct an adaptive story about the emergence of these biases, which then themselves form the basis for selective processes that rely on automatic, domain-general ‘rules-of-thumb’, rather than domain-specific, intelligent, individual decisions. If the reason why fitness-enhancing variants spread is deliberate, conscious, reasoned adoption by individuals, rather than an automatic, evolved instinct or bias, then we would not expect selection dynamics to necessarily hold, or selection models to be useful tools.

Future work to further explore the plausibility and value of a prestige bias account in understanding prestige-biased learning should therefore aim to tease apart and test the predictions made by prestige bias accounts compared to alternatives, and in particular compared to goal-directed accounts.

The concerns I have raised thus far have called into question the explanatory value of cultural selection work, including its application in particular domains, formal modelling, case studies, and empirical evidence for underlying social learning biases. The arguments I have provided should motivate caution regarding the expected epistemic payoffs from a cultural selection

framework. In the final chapter of this thesis, I turn to non-epistemic concerns regarding the effects of adopting selection-based approaches to understanding culture, arguing that the potential for negative non-epistemic consequences provides additional motivation for clarifying the explanatory payoffs of cultural selection.

Chapter 5

Inductive Risk in Evaluating Cultural Selection

1. Introduction

Cultural selection, and cultural evolution more generally, has remained controversial, particularly amongst anthropologists. This is in part due to the bold rhetoric of some cultural evolution proponents, such as Alex Mesoudi, who paint a picture of anthropology as a stagnating and unsuccessful discipline, which has been “much less demonstrably productive” than evolutionary biology (Mesoudi et al, 2006). According to Mesoudi et al, adopting cultural evolution as the dominant paradigm for understanding culture would supposedly afford us leaps in understanding that parallel those made in biology after the adoption of Darwin’s theory of natural selection.

It is unsurprising that cultural anthropologists would not take kindly to this characterisation of their discipline. However, there remains a general distrust of cultural evolution within cultural anthropology. This extends even to those who see evolutionary approaches as complementary to traditional anthropological work, in that they explain specific under-explained features of culture, or operate at a different level of explanation. Many cultural anthropologists do not engage with the cultural evolution project at all, with those who do, such as Tim Ingold, offering scathing critiques. Ingold’s (2007) criticisms are both epistemic and non-epistemic: he attacks cultural evolutionists both for perceived explanatory deficits (such as circularity), and for the de-emphasising of human agency, treating individuals as “trait-bearing cultural clones” (14).

Perhaps part of the reason for this lack of engagement is deep methodological differences, and in particular the central role that ‘population thinking’ plays in cultural evolutionary work. As emphasised by Richerson and Boyd (2005), the term ‘population thinking’ refers to the

practice of abstracting away from in-depth characterisations of individual psychologies and behaviours, in order to understand how individual dispositions give rise to population-level patterns of change or stasis. This kind of abstraction is necessary for, for example, tractable mathematical modelling. This often places cultural evolutionary approaches in direct contrast with the frameworks and methodologies of cultural or social anthropology, for which ethnography is a key tool. Ethnography in some ways represents the antithesis of ‘population thinking’, in that ethnographers typically aim to capture cultural phenomena and individuals with the maximum amount of possible detail and context.

However, in addition to this, as exemplified by Ingold, a significant aspect of the disdain for the cultural evolution project shared by many cultural anthropologists stems from non-epistemic concerns. For example, to ethnographers that are accustomed to understanding cultural phenomena as deeply embedded, and engaging in reflexive evaluation of how they as researchers position themselves in relation to the individuals they study, practices of generalisation and abstraction can appear to have the potential to be deeply dehumanising. Additionally, some of this wariness may relate to the dark history of attempts to apply evolutionary thinking to humans. This history includes social Darwinism, and assumptions of unilinear evolution, in which Western societies are seen as the pinnacle of evolutionary progression (Spencer, 1860). To a large extent, cultural evolution proponents have failed to engage meaningfully with these concerns.

Perhaps the lack of attention to these non-epistemic worries on the part of cultural evolution researchers can be linked to concerns over the spectre of ‘politicised science’. The term ‘politicised science’ encapsulates the worry about the dismissal of scientific research programmes or theories on the basis of social or political values. In other words, some are concerned about the perceived illegitimate role of non-epistemic values in preventing or shaping the pursuit and development of scientific research. There are certainly cases in which this seems like a significant issue: for example, when researchers conducting an industry-funded clinical trial make the decisions to choose an inappropriate control in order to increase the chances of a positive result for the sponsor’s drug.

In this chapter, I wish to make sense of the non-epistemic concerns from cultural anthropologists, in a way that does not give these concerns ‘illegitimate’ influence, and which may be more likely to be taken up by those within the field of cultural evolution. The values that drove, for example, Herbert Spencer’s model of unilinear evolution are readily apparent

and their consequences are clear¹⁹. In the context of cultural selection, the social or political consequences may be less evident; however, I will argue that they do exist, and that we should take them into account. I use the concept of inductive risk as a means of understanding how non-epistemic values must play a role in decisions whether to pursue or adopt cultural selection frameworks. My primary aim is to demonstrate that there is a legitimate role for non-epistemic values (social and political values in particular) to play in the evaluation of the cultural selection project, and that cultural selection proponents should therefore take these concerns seriously. This argument for the most part applies to cultural evolution more generally, including the work of the Paris School, which de-emphasises the role of selection. However, I will focus particularly on cultural selection frameworks here.

The significant role that non-epistemic values play in science has long been recognised. For example, Helen Longino (1990) identifies three points at which non-epistemic values play a legitimate role in guiding scientific inquiry. Firstly, in the selection of which problems to pursue: for example, political and ethical considerations that drive research into climate change. Secondly, in directing how scientific knowledge is used, once it is produced: for example, ethical and governance considerations which affect how the knowledge and products generated by synthetic biologists can be disseminated and put to use. Thirdly, in placing limitations on methodological options: for example, the treatment of human subjects in clinical trials.

Supporters of what is often termed the ‘value-free ideal’ in science do accept that non-epistemic values can affect the scientific process broadly, in the ways outlined by Longino, while maintaining that the ‘internal workings’ of science can be free from the influence of non-epistemic values. This means that, while social or political values might influence so-called ‘external’ aspects of scientific inquiry, such as the problem agenda or how the knowledge produced is then used, the ‘internal’ aspects of the scientific process should be guided only by epistemic values. This is not to say that this is always achieved in practice, but rather, that this is both possible and the normative standard we should be striving for.

In contrast, critics of the ‘value-free ideal’ point to junctures in internal scientific reasoning where non-epistemic values necessarily enter into the process (and perhaps should be welcomed). One way in which this occurs is through the introduction of inductive risk. The

¹⁹ Darwin himself also endorsed this view, seeing gradations “between the highest men of the highest races and the lowest savages” (1871, 35)

concept of inductive risk refers to the risk involved with the acceptance or rejection of a hypothesis: in the decision whether to accept a given hypothesis or not, there is always the risk of either accepting a false hypothesis (a Type 1 error, or ‘false positive’) or rejecting a true hypothesis (a Type 2 error, or ‘false negative’). When these errors have non-epistemic consequences, non-epistemic values will influence the ‘rule of acceptance’ (the level of evidence or statistical significance required to accept the hypothesis).

Here, I argue that a kind of inductive risk is present when we consider the adoption and pursuit of the cultural evolution project as a whole, and of certain research programmes within cultural evolution. We are faced with a choice about whether to adopt an evolutionary approach, which carries with it possibilities of ‘false positives’ or ‘false negatives’, in a similar way to the decision whether to accept or reject a hypothesis. The decision to adopt these frameworks is partly dependent on the balance we are willing to strike between ‘false positives’ and ‘false negatives’, and as these errors have social and political consequences, social and political values enter into the calculation. I argue that consideration of these consequences means that we should exercise caution, and aim to clarify our explanatory goals and expected gains before developing and applying cultural selection frameworks and models further.

As will be addressed in further detail later in this chapter, there is a strict sense of inductive risk which is limited to the acceptance or rejection of hypotheses, typified in the setting of statistical significance levels. In some ways, the decision to pursue or adopt cultural selection frameworks and methodologies differs significantly from classical cases of inductive risk. However, viewing the decisions faced in the case of cultural selection through the lens of inductive risk allows us to highlight two features: firstly, that non-epistemic values do necessarily enter in to the internal research process, and therefore must be considered, and secondly, to emphasise an indirect role for non-epistemic values. I argue that inductive risk at least presents a useful way in to establishing the legitimate role of non-epistemic concerns in the case of cultural selection, which could result in engagement with these concerns on the part of researchers in the field.

In Section 2 I give a sketch of the inductive risk argument and how it applies to cultural selection. In Section 3 I address possible objections to the use of the inductive risk argument in this case, arguing that although the context is somewhat different from the context in which the inductive risk argument was proposed and is usually used, we are faced with a

structurally similar decision. Furthermore, using the inductive risk framework has strategic benefits over other conceptions of the role of values in science. I then provide an outline of the kinds of consequences entailed by ‘false positives’ and ‘false negatives’ in Section 4, in order to further make the case that there are relevant consequences associated with these kinds of errors, and we therefore must weigh these against each other. In light of these consequences, some may argue that this is a reason to abandon cultural selection entirely. In Section 5 I argue that this is not the case, and the identification of negative social and political consequences should spur reflexive evaluation and greater attention to explanatory concerns.

2. The Inductive Risk Argument

The inductive risk argument poses a challenge to the ‘value-free ideal’, in that it articulates a role for non-epistemic values even within the internal process of scientific reasoning. An early formulation of the concept of inductive risk can be found in Rudner’s (1953) account, which asserts that the more serious the social or ethical consequences of accepting a hypothesis which is in fact false, the more evidence should be required before we accept this hypothesis. Hempel (1965) also provides an account of inductive risk, in which it is framed in terms of ‘rules of acceptance’: because no evidence can establish a hypothesis with complete certainty, acceptance of a scientific hypothesis occurs according to a ‘rule of acceptance’, which is a kind of decision rule. The formulation of these rules of acceptance therefore depends on the valuing of the various possible outcomes, and in some cases the values involved will be non-epistemic. Heather Douglas has revived this argument more recently, renewing discussion about the role that inductive risk plays in various scientific fields. In this section I will introduce the inductive risk argument as delineated by Douglas, then briefly outline how this argument runs in the case of cultural selection.

As Douglas articulates it, in some cases the decision to accept or reject a scientific hypothesis, for example through the choice of a level of statistical significance, has both epistemic and non-epistemic (value-laden) components (Douglas, 2000). Acceptance or rejection of a hypothesis can entail a variety of consequences: it can shape decision-making, for example through forming the basis of policy, or guiding future research. In all cases, when we set our significance level, we have to balance the probability of making Type 1 errors (false positives) against the probability of making Type 2 errors (false negatives). ‘False positives’ occur when we accept a hypothesis that is in fact false, and ‘false negatives’ occur when we reject a

hypothesis that is in fact true. It is necessary for some decision to be made about the balance of these two types of errors for any given experiment. As we are not able to lower the probability of both types of error without designing another more accurate experiment, we are forced to make a trade-off between them.

The kinds of consequences involved when accepting or rejecting a given hypothesis are likely to vary between different fields of science. For example, social or political consequences may often be involved in hypothesis testing in areas such as medicine or the social sciences, whereas there may be little or no social or political considerations involved in hypothesis testing in theoretical physics²⁰. Additionally, a key part of the inductive risk argument is that it relies on uncertainty. The greater the uncertainty in the decision whether to accept or reject the hypothesis, the greater the inductive risk. If there is a case with very low levels of uncertainty, then the probability of being incorrect (committing either a Type 1 or Type 2 error) is so small that even if the consequences of one type of error are much more severe than the consequences of the other, our non-epistemic values will not have much influence on whether the hypothesis is accepted or not. Therefore, non-epistemic values will have a greater effect in cases of greater uncertainty. Betz (2013) offers a possible way around inductive risk considerations, through the careful articulation of uncertainty and presentation of ‘hedged hypotheses’. Without delving into details of possible responses to this here, although this may present an issue for inductive risk in a strict sense, in the broader sense I use in the case of cultural selection (which will be addressed in Section 3), this is less of a relevant concern.

As a clarificatory aside, there is some debate in the literature over the extent to which it is possible to distinguish between epistemic and non-epistemic values. For example, Longino (1996) argues that some values that are typically considered ‘epistemic’, such as consistency with existing accepted theories, are not purely epistemic, and can incorporate social values. Douglas (2009) similarly problematises this distinction, distinguishing between epistemic and cognitive values. Cognitive values, under Douglas’ definition, include values often classed as epistemic (such as scope and simplicity), on the basis that these features are not strictly indicative of the truth of the theory.

²⁰ This is not to say that non-epistemic values never come into play in a discipline such as theoretical physics. One example might be disciplinary norms that dictate the standard of statistical significance, where those disciplinary norms are not determined by purely epistemic factors.

However, we can set this debate aside for the argument I am making here. The kinds of consequences and therefore kinds of values I am primarily concerned with in the case of cultural selection are social or political, which are distinctly non-epistemic. In this paper, I will refer to social, political, and ethical values as non-epistemic, and use a broad definition of epistemic values to include values such as consistency, scope, and simplicity (while recognising this is a somewhat artificial distinction, and these ‘epistemic’ values can and do have non-epistemic components). This is due to the context of the debate surrounding the proper versus improper role of values in science: supporters of the ‘value-free ideal’ typically accept the influence of epistemic values in internal scientific investigation while rejecting the influence of non-epistemic values. One way to undermine this is to undermine the distinction between epistemic and non-epistemic values; another way is to illustrate ways in which distinctly non-epistemic values influence the internal scientific process (which is the aim of the inductive risk argument, and my focus here).

2.1 The Case of Dioxins

The example Douglas uses to illustrate inductive risk is the investigation of environmental toxins. Laboratory animal studies were conducted into the potential harms of dioxins, a persistent environmental pollutant that can accumulate in the food chain. The results of these studies were used to determine whether dioxins had particular effects, as well as what the dose-response relationship was. In this example, a false positive would mean dioxins being found to have a particular effect when they in fact do not, or being found to have an effect at a certain dose level when they do not. In contrast, a false negative would mean that dioxins being found not to have a particular effect when they in fact do, or being found not to have an effect at a certain dose level when they do have such an effect. The consequence of false positives here is overregulation (setting too high a regulatory standard for levels of dioxins in the environment). The consequences of false negatives are harms to human health (setting too low a regulatory standard, which leads to people consuming unsafe levels of dioxins). Clearly, the balance between false positives and false negatives will depend on how we value the harms of overregulation versus the harms to public health.

Douglas identifies several points in this investigation in which inductive risk plays a role. For example, there are two possible dose-response models that could be employed to extrapolate from laboratory findings: one that assumes there is no effect caused by the substance under a certain dose (the threshold model) and one that assumes a decreasing effect with decreasing

dose (the linear extrapolation model). The choice of the threshold model has a greater probability of false negatives (where the substance does have a significant effect at levels lower than the set ‘safe’ dose), and the linear extrapolation model carries a greater probability of false positives (where the substance does not have an effect at levels lower than the set ‘safe’ dose). Here, it is not only the p-values of the study results that involve an element of inductive risk, but also the choice of model used to extrapolate data from. Inductive risk can also be present in the characterisation of the data itself: in the dioxin case, rat livers are biopsied and the slides of the liver tissue are examined by pathologists, who count the tumours and determine if they are benign or malignant. There are often ‘grey areas’, where pathologists disagree on whether a tumour is benign or malignant. It is necessary to choose a balance between over-characterising tumours as malignant (false positives) or under-characterising them (false negatives). Finally, the weight given to previous studies and the background assumptions made will influence the plausibility of the threshold model versus the linear extrapolation model. The effect of these examples is to demonstrate that inductive risk can enter in at multiple points in the ‘internal’ parts of scientific investigation, even setting aside problem selection and how the knowledge produced is utilised.

2.2 The Application of Inductive Risk to Cultural Selection

How do arguments for inductive risk apply to the evaluation of cultural selection? I suggest that we face a similar decision when evaluating the promise of cultural selection approaches. Inductive risk can enter into both the decision to pursue and the decision to adopt cultural selection frameworks. This is because we are faced with the decision of where to set the threshold of evidence above which we will pursue cultural selection research (develop models, conduct studies etc). This decision-making process will involve both epistemic considerations (how fruitful we believe these endeavours are likely to be) and inductive risk considerations (balancing the two types of errors given our uncertainty in the fruitfulness of these avenues). Additionally, we also have to decide upon the threshold of evidence at which we adopt cultural selection frameworks and methodologies as the (or a) dominant paradigm with which to study culture, allowing evolutionary assumptions, goals and methods to guide research.

Adopting or furthering a cultural selection framework to deal with aspects of cultural phenomena has associated risks of ‘false positives’ and ‘false negatives’. A false positive in this case would be adopting and pursuing a cultural selection framework for a wide set of

cultural phenomena when in fact it transpires that there is little explanatory benefit to adopting such a framework. A false negative would therefore then be choosing not to utilise cultural selection models when, if we had, it could have offered powerful and unique insights into cultural change.

It may not seem obvious that there are non-epistemic consequences to adopting an evolutionary approach to culture. However, cultural selection frameworks are not politically neutral, but are necessarily embedded in a particular political and social context that means that the use of the framework itself can have a range of wider social effects, and negative effects on already marginalised groups. The consequences of false positives and false negatives will be spelled out in detail in Section 4, where I argue that the consequences of false positives are far more severe than the consequences of false negatives, and therefore we should weight our threshold in order to avoid false positives, even though that entails a greater probability of a false negative.

The upshot of acknowledging the existence of inductive risk in evaluating cultural selection is that we should be cautious about pursuing or adopting cultural selection frameworks or models; at the least, we should carefully consider the potential for explanatory or epistemic gains. In Section 5 I outline the practical implications for cultural selection research of taking inductive risk considerations seriously.

In the following section I address the worry that the evaluation of cultural selection frameworks is not relevantly analogous to the kinds of cases usually dealt with by inductive risk considerations, and that we therefore do not encounter inductive risk when evaluating cultural selection frameworks.

3. Does Inductive Risk Apply to the Pursuit and Adoption of Research Programmes?

One potential concern is that the inductive risk argument does not apply in this situation. Here I argue that the setting of the evidential threshold in the pursuit or adoption of cultural selection frameworks and models does structurally resemble classic inductive risk cases, that we have levels of uncertainty in making these decisions that renders inductive risk a

significant concern, and I defend my position against the claim that this is stretching the concept of inductive risk too far.

A standard example of inductive risk involves the acceptance or rejection of a scientific hypothesis. For example, we may consider a single study, where we use inductive risk considerations to determine the statistical significance level (p-value) at which we accept the hypothesis. On its face, this may seem fairly distinct from what we are faced with when evaluating cultural selection frameworks. In the case of cultural selection versus alternative approaches to culture, we are evaluating an entire framework or theoretical approach rather than accepting or rejecting a single hypothesis. We might be making a series of judgements about the promise of the framework, with no analogue to significance level or threshold.

However, upon closer examination, the decisions we are faced with in the case of cultural selection are structurally similar to the kinds of cases in the inductive risk literature. There are two types of decisions that we could be faced with about a given cultural selection framework, or cultural evolution in general: firstly, whether to pursue cultural evolution research, and secondly, whether to adopt cultural evolution frameworks and methodologies as a guiding paradigm in the study of culture.

In the decision whether to pursue cultural selection research, we are deciding whether to continue to develop cultural selection models, to carry out empirical studies, and to devote time to theoretical work on cultural selection. This decision will involve both epistemic and non-epistemic components. The kinds of considerations involved are captured in the literature on the ‘context of pursuit’, which has been described as a “nether region” in between the ‘context of discovery’ and the ‘context of justification’ (Laudan, 1980). ‘The context of pursuit’ is the part of the scientific process which involves the preliminary or exploratory evaluation of scientific theories, where decisions are made whether or not to pursue a certain research programme or study. During this process, we would expect epistemic values to play a significant role in guiding which theories and research programmes are pursued and which are not, although perhaps not as ‘strictly’ as is usually required for the process of justification. ‘Pursuit worthiness’ is often characterised in relation to a set of goals, which may be both epistemic and ‘practical’: so, considerations such as the perceived tractability of the studies needed to develop the theory will enter into the decision to pursue a theory, model or research programme (Šešelja et al, 2012).

Those who worry about the possibility of ‘politicised science’ would still consider political values as direct reasons for not pursuing a theory to be potentially illegitimate. Here I use ‘direct’ in the sense that Douglas (2009) employs it, when she draws a distinction between direct and indirect roles for values. As she lays it out, values directly entering into theory acceptance would mean a theory being accepted or rejected *because* it fits or does not fit a certain social or political agenda.²¹ In contrast, in inductive risk, social or political values play an indirect role: they modulate the evidence threshold, without themselves functioning as evidence. In the context of pursuit, a direct role for social or political values would mean pursuing or not pursuing a research programme, for example, *because* it meshes with or goes against these values.

I would suggest that in the decision or set of decisions made about pursuing cultural selection as a research programme, we are faced with inductive risk, and so social and political values enter in, in an indirect role. This is because we have to decide on some kind of threshold or standard of evidence, or baseline plausibility, upon which we determine cultural selection to be pursuit-worthy. This incurs inductive risk because pursuit in itself can cause these consequences (which will be elaborated on in the following section). Clearly, cultural selection as a research programme is already being pursued: there is work going back decades (e.g., Cavalli-Sforza and Feldman, 1981; Boyd and Richerson, 1985) that has built selection-based models to explain cultural phenomena. However, decisions to pursue cultural selection are ongoing, and every time we are faced with this decision inductive risk comes into play.

Additionally, when we decide whether to adopt cultural selection as a guiding paradigm, we are also faced with setting a threshold or standard of evidence. In the case of pursuing new models, studies, or strands of cultural selection, we may be looking primarily at preliminary evidence, or evidence for the baseline plausibility of such avenues of research. Once we develop a body of evidence and theory, and are considering the adoption of cultural selection as a framework for future research, we are faced with evaluating that body in order to determine its fruitfulness as a guiding paradigm. Adoption of a particular cultural selection framework will direct our attention to certain phenomena over others and shape how we interpret those phenomena. We are therefore also faced with the setting of an evidential threshold or standard above which we will adopt the cultural selection framework. Inductive

²¹ This boundary does have the potential to be blurred: if the consequences of a false positive are severely negative, then we might require so high an evidential threshold for hypothesis acceptance as to effectively reject it outright.

risk enters in at the point of deciding at which level to set this standard, and social and political values play a role insofar as there are social or political consequences to committing one or both types of error.

A somewhat similar argument was advanced by Philip Kitcher, in his 1985 book *Vaulting Ambition*, in the context of sociobiology. Kitcher, discussing sociobiological studies that claimed that human behaviours such as racism were evolutionary adaptations, argued that the standards for accepting the results of these studies as evidence should be at least as high as the standards that are used in evolutionary accounts of animal behaviour. In fact, it was the case that these studies often had much lower evidential standards than animal behaviour studies. Here, Kitcher emphasises that the social and political consequences of such studies form part of the argument for setting evidential standards. He largely argues for the modest position that the evidential standards should be the same (at minimum) as those used in animal behaviour studies. However, the inductive risk argument would license the conclusion that we should set higher standards for these studies than for other evolutionary studies that do not have the same kinds of social consequences. This is because when we make decisions about where to set the evidential threshold, both epistemic and non-epistemic values will come into play, and where there are significant negative consequences to accepting a theory, we should set the evidential standard higher. In the case of cultural selection, we are interested in the contrast with other frameworks and methodologies for understanding culture (often those from cultural anthropology).

3.1 The Role of Uncertainty and Error

As outlined in Section 2, the role that inductive risk plays is proportional to the level of uncertainty surrounding the hypothesis. If the chance of error is small, then inductive risk (and therefore, non-epistemic values) play a smaller role; if the chance of error is large, then the inductive risk is larger, and non-epistemic values have greater influence. In the case of cultural selection, there appear to be high levels of uncertainty. Comparatively little attention has been given to explicitly outlining the explanatory gains expected from cultural selection approaches, compared to demonstrating that in principle cultural phenomena could (for example) fulfil the Lewontin conditions for evolution by natural selection. There is therefore potentially much uncertainty surrounding the evaluation of potential explanatory or epistemic gains. Hence, we would expect inductive risk to be significant here.

In some ways, the assessment of the level of uncertainty operating here parallels aspects of the dioxins example outlined in Douglas (2000). In the debate over whether studies show a threshold for the carcinogenic effects of dioxins, which side one finds oneself on will depend on the aspects of evidence one chooses to emphasise, and the background assumptions adopted. The evaluation of cultural selection will depend somewhat on one's stance on the prima facie plausibility of an evolutionary approach to culture and human behaviour more generally. Although I will not explicitly argue for high levels of uncertainty here, I will suggest that the controversy amongst anthropologists regarding cultural evolutionary work is perhaps indicative that there are at least some levels of uncertainty. Additionally, authors have pointed to fundamental problems with cultural evolutionary frameworks, such as the social learning biases that are taken to underlie models in the cultural selection school of cultural evolution (Lewens, 2015). I take these issues to indicate that there is enough uncertainty in the decision to pursue or adopt cultural selection that inductive risk truly arises.

I will note here that the case of cultural selection could come apart somewhat from classical cases of inductive risk in terms of the significance of error. In Douglas' dioxins example, the negative consequences flow from the decision to wrongly accept or reject a given hypothesis. To some extent, in this case we may think that negative consequences arise from the pursuit and adoption of cultural selection frameworks even if we are correct about the epistemic and explanatory benefits of employing these frameworks. However, there is a sense in which a false positive may have worse consequences that would be mitigated if instead we had a 'true positive' (we pursue cultural selection as a research programme and it turns out to have immense explanatory payoffs). Under a true positive, cultural selection research could produce genuine practical benefits in the areas of (for example) sustainability and conservation, which could positively impact the marginalised groups that are affected in ways I outline in section 4.

3.2. Are we Stretching Inductive Risk Too Far?

In recent years, inductive risk has been applied to many areas of scientific decision-making. Biddle (2016) argues that cases outside the classical formulation of inductive risk, of which setting of standards of statistical significance is a paradigm example, in fact should not be characterised in terms of inductive risk. These cases include characterisation of evidence, choice of methodology or background assumptions, and definitions (and include parts of

Douglas' dioxins example, such as the choice of threshold versus linear extrapolation model, or the evaluation of rat liver slides). He argues that these kinds of cases should be more broadly, in terms of 'epistemic risk'.

Certainly, inductive risk is not the only way to frame the kinds of decisions being made in the case of cultural selection. Elizabeth Anderson (1995, 52) puts forward a "cooperative model of the interaction of normative and evidential considerations in theory choice". She argues that as not all sets of true statements about a given phenomenon constitute an acceptable theory of that phenomenon (i.e. some sets will offer a skewed or biased representation, even if they are true), and therefore what constitutes an acceptable representation will be relative to an agent's values, interests, and aims. Perhaps, we could view cultural selection through a similar lens: any given cultural selection model could be understood as offering a partial and distorted representation of cultural phenomena, and our non-epistemic values should guide theory choice. We could take a different view of the role of values in science, such as Anderson's or Sharyn Clough's (outlined in her 2003 book *Beyond Epistemology: A Pragmatist Approach to Feminist Science Studies*), which might mean arguing for a direct role for social and political values in the pursuit or adoption of cultural selection.

However, what invoking the inductive risk apparatus achieves here is to highlight that we are inescapably faced with particular kinds of decisions, and non-epistemic values have an unavoidable role to play in making these decisions. I am interested in framing decisions to pursue or adopt cultural selection in terms of inductive risk in order to draw particular attention to the ways in which we are forced to consider social or political values in evaluating these frameworks. This aspect is not emphasised or articulated in anthropological critiques of cultural evolution, which could be construed as offering a 'direct' role for values in dismissing cultural evolution. This perhaps contributes to the lack of engagement with these critiques from cultural evolution proponents. The indirect role of values I argue for here does not crucially rely on the kind of risk involved being inductive risk specifically, could be couched in terms of 'epistemic risk' for those who wish to restrict inductive risk strictly to cases of hypothesis testing, and is not incompatible with other ways of understanding values in science.

In the following section, I outline some consequences of 'false positives' and 'false negatives' in the case of cultural selection, in order to show that these social and political consequences do exist, and should be taken into account.

4. Consequences of False Positives and Negatives

If we accept that we are making a structurally similar decision in the case of assessing cultural selection frameworks to the kinds of cases typically cited in the inductive risk literature, and that a kind of inductive risk calculation will occur, then the next consideration is whether this decision does in fact have non-epistemic consequences. The cultural selection literature, when questions of explanation are explicitly considered, tends to have focused on the epistemic goods that could potentially come from adopting an evolutionary framework. This is evidenced in the parallels drawn with the success of Darwinian theory in the realm of biology, with the implication that the unification of disparate fields and phenomena, the development of useful models, and the transformation of our understanding that evolutionary theory brought to biology could be replicated for the study of culture. Far less consideration has been given to the non-epistemic (social, political and ethical) consequences that pursuing or adopting cultural evolutionary approaches would bring.

To some readers, perhaps the non-epistemic consequences are less clear in the case of cultural selection than in ‘typical’ inductive risk cases. To return to the example of environmental toxins, we are faced with a trade-off between overregulation and harms to human health. Here, the results of laboratory studies are used to set regulatory standards. In contrast, cultural selection research does not have any obvious link to the formation of government policy. However, in this section I will argue that clear social and political consequences do arise from the pursuit and adoption of evolutionary explanations in the domain of culture.

It is not my intention here to prescribe precisely how we should navigate the trade-off between false positives and false negatives. How exactly we do this will depend on numerous factors: i.e., how we assess the potential explanatory losses and non-epistemic losses from failing to pursue or adopt cultural selection models, versus the extent to which using these models contributes to existing structures of oppression. However, as will be discussed in Section 6, the fact that this trade-off arises should provide a spur for rigour in the evaluation of cultural selection, and cultural evolution more broadly.

In this section, I will sketch out some possible consequences of false negatives and false positives in the case of cultural selection. Without expounding on these in detail, given that

the existence of these consequences in the first place may not be immediately clear, my aim is to argue here that we have good reason to believe that these consequences do in fact exist.

Although inductive risk is present when evaluating any of the various research programmes within cultural evolution, or an evolutionary approach to culture as a whole, and will generate many of the same consequences, some specific consequences will differ between frameworks. I will limit my focus here to cultural selection thinking and models, as it represents a significant subset of the cultural evolution literature and perhaps has the potential for particularly pernicious social consequences.

4.1 False Negatives

The consequences that stem from a false negative appear to be largely epistemic, although there may also be non-epistemic consequences. To reiterate, a false negative in this situation would be where we decide not to pursue cultural selection studies or develop cultural selection models, or where we decide not to adopt cultural selection as a framework for understanding culture, when in fact we could have made significant gains in understanding from doing so. The primary negative consequence stemming from a false negative would appear to involve missing out on a fruitful way of understanding aspects of culture.

Proponents of cultural evolution tend to emphasise the potential for epistemic gains. As already mentioned, the clearest demonstration of this is in a paper by Mesoudi et al (2006), where they see the potential of the cultural evolutionary project as rivalling the contribution that evolutionary theory has made to biology. We also see this in cultural selection work in particular. If the claims of authors such as Henrich, Richerson and Boyd are compelling, then it seems like a scenario where we abandon the cultural selection project, when in fact it could have spawned a fruitful research programme, would result in missing out on significant explanatory gains, leaving us with an impoverished understanding of human culture.

There are also possible non-epistemic consequences. There have been some efforts to develop applied cultural selection research, that attempt to understand aspects of innovation or social institutions (e.g., Henrich, 2001). As discussed in Chapter 2, the application of cultural selection to sustainability science has been carried out with the hope of generating better-targeted policy interventions. These efforts could, in theory, lead to improvements in fostering innovation, or in developing and maintaining beneficial institutions (which we would miss out

on by abandoning cultural selection frameworks). However, it is important to note that the practical benefits of these attempts have been called into question (Lewens, 2002, 2004).

I will not delve into the debate over the expected epistemic or explanatory gains of cultural selection again here. However, I will note that, even according to cultural evolution proponents, the consequences of a ‘false negative’ can be characterised as largely epistemic, though there may be non-epistemic components.

4.2 False Positives

I will highlight three possible kinds of negative social and political consequences that could arise out of a false positive in pursuing or adopting cultural selection. These are likely not the only consequences, and further, deeper analysis is critically needed to evaluate what the possible impacts might be. It is also necessary to note that the decision to pursue or adopt cultural selection is always made in comparison to other alternatives, and so part of making our inductive risk trade-off will involve understanding the social and political consequences that arise out of anthropological, historical or sociological frameworks. While I do not space to explore this here in any depth, I will suggest that we can expect that at least some of these consequences are unique, either in degree or in kind, to ramifications of anthropological work (and ethnography in particular).

The first consequence I will discuss relates to the de-emphasising of human agency. The second arises out of the stripping away of context and nuance in productions of ‘thin’ descriptions of cultural phenomena to be used in evolutionary models. Both of these could be said to apply to cultural evolution work from all schools, although the examples I will use are from the cultural selection framework. The last relates to the reality that, at least in the public imagination, evolution or selection connotes ideas of progress. I outline these, drawing connections with similar kinds of consequences articulated in the context of research into gender and racial differences. I then address the worry that the kinds of harms that form the consequences of false positives are too diffuse and unquantifiable to be considered in a trade-off between the two types of errors, and that this gives the inductive risk argument less force in this case.

4.2.1. De-emphasising Human Agency

One key consequence of pursuing or adopting cultural selection stems from the way in which this framework de-emphasises human agency, which has the potential to dehumanise, ‘other’, and exoticise. This is an aspect which Ingold picks up on and rails against. He writes of cultural evolution as:

...an affront to millions of intelligent human beings for whom traditions are real and important but who are not, on that account, trait-bearing cultural clones whose only role in life is to express - in their behaviour, artefacts and organisations - information that has been transmitted to them from previous generations only to have their performances observed and recorded in their natural habitat, along with other forms of wildlife, by intruding scientists (Ingold, 2007,14).

Ingold’s complaint is gesturing at the processes of ‘othering’ and exoticisation. Stripping other human beings of agency allows for dehumanisation, and the construction of an ‘us’ and ‘them’, a studier and a population to be studied.

We can see how cultural selection may de-emphasise human agency through the use of an example from Chapter 4, that of Henrich and Henrich’s (2010) study on food taboos in Fiji, which they characterise as a case of prestige-biased transmission. To briefly reiterate, they characterise taboos surrounding the consumption of certain marine species by pregnant and breast-feeding women as ‘culturally evolved adaptations’. For Henrich and Henrich, learners acquire cultural variants (the food taboos) from low-cost learning models (close female relatives), as well as ‘preferred models’ (‘yalewa vuku’, respected and knowledgeable women within the community). Here, we see a characterisation of the phenomenon that downplays, or entirely purges, any role for human agency. Instead, this ‘adaptive’ behaviour is explained through patterns of biased transmission, likely built through rounds of previous genetic and cultural selection.

The ways in which this characterisation minimises human agency is brought out further by consideration of the comparative example I introduced in the previous chapter. In my goal-directed agent case of a pregnant woman in Cambridge consulting various sources of information and deliberating as to the best actions to meet her goals (the health of her child), the agency of the woman in question is clearly foregrounded. This case follows the same structure as the case of Fijian food taboos (as shown in Chapter 4), and yet it

emphasises human agency. This contrast illustrates the potential for cases with the same structure either to acknowledge or to minimise individual agency.

Why should the de-emphasising of human agency be seen as a potential negative consequence of cultural selection explanations? Some may point out that there is also cultural selection research carried on in Western populations (such as the lab-based studies of prestige bias described in the previous chapter). However, given our current social and political context, we would expect the consequences of developing and applying cultural selection models in non-Western or indigenous communities to differ from their application in a Western context. One such consequence of this minimising process is the contribution to the construction of an ‘us’ and ‘them’; in this example, ‘our’ pregnant women who use their agency and decision-making capacities to come to an informed decision about what is best for their children by taking on board the advice of family and experts, versus ‘their’ pregnant women who are, in Ingold’s words, “trait-bearing cultural clones”.

Formally, this is known as ‘othering’. ‘Othering’ is a term originating from post-colonial theory, and refers to the process by which an ‘us’ and a ‘them’ are constructed (Spivak, 1985). Lister (2004, 101) defines ‘othering’ as a “process of differentiation and demarcation, by which the line is drawn between ‘us’ and ‘them’ – between the more and the less powerful – and through which social distance is established and maintained”. ‘Othering’ paves the way for the dehumanisation of the ‘other’: it plays a role in licensing acts of violence and oppression, or prescribing ethical boundaries. The process of ‘othering’ appears to not only be a consequence of cultural selection work, but also runs in the opposite direction: it impacts the ways in which we evaluate the epistemic and explanatory payoffs of cultural selection. I have argued for the explanatory deficits of Henrich and Henrich’s work on food taboos, which seem apparent when contrasted with the Cambridge case. It seems plausible that the explanatory ‘pull’ of a selection based explanation in the Fiji case may have been boosted by processes of ‘othering’, where we find it easier to see non-Western women as lacking agency.

‘Othering’ and dehumanisation have been tools for violence, both material and epistemic. Historically, ‘othering’ has been used as part of the rationale for colonialism, to justify subjugation, domination, and physical violence. Spivak, in her 1985 essay “The Rani of Sirmur”, provides the first systematic development of the concept, through analysis of British colonial power in India. Spivak outlines three dimensions of ‘othering’: firstly, the demonstration of power over ‘subordinates’, secondly, the construction of the ‘other’ as

inferior, and thirdly, the construction of the powerful as the owners of knowledge and technology. We also see a description of the process in Edward Said's *Orientalism*, a foundational text of postcolonial theory which critiques Western representations of 'the Orient'. According to Said, the function of orientalism is to "at one and the same time to characterize the Orient as alien and to incorporate it schematically on a theatrical stage whose audience, managers and actors are for Europe, and only for Europe" (1978, 71-72). For Said, this characterisation is directly linked to the reproduction of power relations. He uses the example of Arthur Balfour's 1910 speech to the House of Commons to illustrate the interlinking of knowledge with power: "as Balfour justifies the necessity for British occupation of Egypt, supremacy in his mind is associated with "our" knowledge of Egypt" (ibid, 40).²² Linda Tuhiwai Smith builds upon Said's work in *Decolonising Methodologies: Research and Indigenous Peoples*. She spells out the ways in which the construction of the 'other' in the service of colonialism has involved the minimisation of agency: indigenous peoples were treated as objects of research, and "objects of research do not have a voice and do not contribute to research or science" (1999, 55).

'Othering' is not only a tool for understanding past injustices, but is also an ongoing process which continues to feed into neocolonialist practices, into the way Western and white subjects view non-Western migrants of colour, and into a myriad of institutions, structures and attitudes that prop up the racial hierarchy. This has material consequences for those who are 'othered'. For example, Johnson et al (2004) use ethnographic methods to demonstrate the ways in which 'othering' of South Asian women in Canada contributes to marginalisation and exclusion of these women, and in particular the ways in which this affects healthcare access and health outcomes. Similarly, Grove and Zwi (2006) argue that the 'othering' of refugees and asylum seekers who migrate to developed countries contributes to the denial of healthcare to these populations. The consequences of 'othering' are not limited to health outcomes: Rich and Troudi (2006) suggest that experiences of 'othering' from Arab students contributes to barriers to learning in a classroom setting, and Wright (2010) links the

²² There are multiple other precursors to the notion of 'othering' found in Spivak. For example, Gingrich (2004, 11) outlines the influence of Lacan's conception of the other and its role in identity formation on Spivak's work. Additionally, 'othering' can happen on other axes than race. Simone de Beauvoir's *The Second Sex* (1949) introduces the idea that men are constructed as the norm whilst women are constructed as the other (and are understood in relation to the norm).

‘othering’ of black students in Britain with lower educational attainment and higher probability of exclusion from school compared to white students.²³

The violence brought about by ‘othering’ is not only material but also epistemic. Epistemic violence is a term used in a broad sense by Spivak (1988), and refers to harms brought about by discourse. One aspect of epistemic violence is silencing marginalised groups, as well as the dismissal of local knowledge in order to privilege a subset of epistemic practices (typically Western) (Dotson, 2011). When groups of people who have historically been denied agency are described in terms that once again strip them of their agency, this could have the potential to reinforce hierarchies of who is and is not afforded their full humanity, and who is and is not considered a ‘knower’.²⁴

Through the minimisation of human agency, particularly in research in non-Western populations, we can see that cultural selection has the potential to play into this process of ‘othering’, and therefore feed into the negative consequences that arise from ‘othering’. It is important to note here that the ways in which cultural selection models might reify white supremacy and colonialism are incredibly indirect. They form a tiny part of the giant patchwork of institutions, social structures, individual attitudes, state actions, and systems of knowledge production that produce and maintain power relations and hierarchies. This is why to many, it will not be clear that we should abandon the cultural selection project entirely, from the offset, solely on the basis of social and political ramifications. I simply wish to point out that these consequences do arise, in however diffuse and indirect a way, and therefore should be taken into consideration when balancing the two possible types of error.

4.2.2. Stripped-Down Modelling

Another way in which cultural selection research could have a negative social or political impact stems from the construction of idealised models. Creating cultural selection models necessitates abstracting away from a lot of the specific details of any cultural phenomena or group, in order to make it tractable for modelling purposes. This is specifically cited as one of

²³ The areas of healthcare and education are two examples of research into the effects of ‘othering’. There are many others, including the effect of ‘othering’ on international relations and foreign policy (Reinke de Buitrago, 2012), and on our moral and legal attitudes to human trafficking (Todres, 2009).

²⁴ Miranda Fricker (2007) has provided an influential account of what it means to wrong someone as a knower, through the concept of epistemic injustice, expanded and developed by Jose Medina in his 2013 book *The Epistemology of Resistance*.

the reasons for the supposed great disparity between the productivity of evolutionary biology and cultural anthropology in Mesoudi et al's (2006) paper: evolutionary biologists' willingness to make simplifying assumptions, and to transform data into quantities that can be inputted into mathematical models has allowed them to draw generalisable conclusions, which bring significant explanatory gains. This approach lies in stark contrast to ethnography, one of the key methods of cultural anthropology, which emphasises a close, qualitative, contextual approach. Ethnographies are in some ways the opposite of cultural selection models: they involve detailed descriptions of agents, concepts, and the context in which they are situated.

Cultural selection models use purposefully 'thin' descriptions of tendencies, behaviours, concepts or phenomena in order to generate descriptions of very generic processes, whereas ethnographies construct 'thick' descriptions (Lewens, 2015). Epistemic concerns have been voiced about the stripping-down process that is necessary to create these 'thin' descriptions (oftentimes from 'thick' descriptions generated by ethnographers), such as that levelled by Ingold (2007), who claims this process undermines the integrity of the data. In response to epistemic-based criticisms, cultural evolution advocates could respond that these kinds of arguments could easily apply to the biological world also. The biological world is highly complex, organisms' lives are deeply contextually embedded - and yet, selection models have been wildly successful.

This comparison may have some weight in the debate about the epistemic merits of the cultural selection modelling approach, however, it does not work in the same way when we consider non-epistemic consequences. Evolutionary biologists working on, for example, jaw evolution in vertebrates can feel relatively secure that their work will not have unwanted social or political consequences. The same cannot be said for evolutionary approaches to culture.

The practice of creating 'thin' descriptions of concepts, tendencies and behaviours means making many choices, some of which will be value-laden. When placed in our current social and historical context, these choices can have negative effects on marginalised groups.

The construction of 'thin' descriptions necessarily involves discarding a large amount of information and detail about the phenomena in question. This therefore means making choices about which aspects of a phenomenon to retain and which to discard. One such example is the concept of 'assimilation'. Cultural 'assimilation' is a complex, multifaceted

process, that has no set definition, and varies depending on context and between individuals. It is a process which runs along spatial, temporal, linguistic, social, and psychological dimensions, amongst others, and which in itself has birthed a body of research that builds frameworks and theories attempting to capture aspects of it (Alba and Nee, 1997 provide a partial overview). In cultural group selection work, for example, all the intricacies of this process are collapsed into one word, ‘assimilation’, which, for authors such as Richerson and Boyd (2005), simply means that data points previously categorised as members of Group 1 are now categorised as members of Group 2.

Some of these decisions will be based in large part on epistemic values, and there are epistemic arguments to be had here about the impact of this stripping-down process. However, there are also non-epistemic considerations. For example, historically, people of colour have been denied the opportunity to be the authors of their own narratives (as highlighted by Ingold, 2019). Cultural selection models by their nature create sketches of simplistic, bare-bones causal pathways, where the authors of these models (who are in practically all cases not members of the community under study) make a series of decisions about which aspects of phenomena to emphasise, de-emphasise and discard. Often, the authors of these models are on one extreme of the spectrum of power and privilege, and the communities under study are on the other end. This research is occurring in a context of the systematic disempowerment of certain marginalised groups (which include people of colour, those in the global South, and members of indigenous populations). Those within the communities under study have privileged epistemic access to the content of their own concepts and interpretations of their own behaviours, and yet have historically been denied the means to utilise that privileged access in service of understanding. I do not wish to accuse cultural selection authors of pushing an intentionally racially-charged or discriminatory agenda, but rather to draw attention to the subtle ways in which certain kinds of research have the potential to reinforce existing power dynamics and structures of oppression.

One point to note here is that anthropological or historical work, and even very detailed ethnographies, are by no means immune from these consequences. However, these issues arise slightly differently, due to the practice of ethnographers typically attempting to record the totality of observed behaviour: the aim is to capture the participants’ interpretation of their own behaviour, rather than imposing that of the researcher (Dewan, 2018). In other words, ethnographies aim to produce the ‘thickest’ possible descriptions, and therefore make fewer ‘editorial’ decisions about how to characterise concepts and behaviours. At the least,

ethnographies likely face this specific problem in a different way. Additionally, there has been much reflexive critique surrounding the practice of ethnography, exploring questions such as who has the right to describe, how it might be made more collaborative, and how to navigate the presence of the researcher, which has been lacking so far in the cultural evolution field²⁵. My aim is not to invalidate or dismiss cultural evolution frameworks, but to encourage the same kinds of self-examination, given the potential consequences.

4.2.3 Selection as Progress

Another kind of social or political consequence to consider arises from the interpretation of selection, at least in the public imagination, as connoting progress. This is in large part due to the history of the application of evolutionary thinking to the social domain, which includes eugenics, social Darwinism, and its use in service of colonial rule (Paul, 2009). This can lead to similar consequences as described above: for example, contributing to a process of ‘othering’ whereby Western ‘civilised’ societies are placed in contrast to non-Western, indigenous, or modern hunter-gatherer societies.

One obvious response to this is that, in fact, selection should not connote progress. An accurate reading of evolutionary theory will show that evolutionary trajectories are not unilinear, and do not reliably lead to (for example) increases in complexity. This is true, however, we have to consider the likely implications of the dissemination of cultural selection work.

The significance of concerns over public perception and wider impact have been articulated in the context of research into gender and racial differences. Zack (2003) discusses the effect of research into racial differences in IQ. Here, there exists a strong link in many people’s minds between ‘racial differences in IQ exist’ to ‘natural/innate racial differences in IQ exist’ to ‘we should not care about changing racial disparities we see in society’. Although none of these steps are logically entailed, and in fact can be strongly refuted, the fact that this research will have predictable consequences of upholding white supremacy means that we should carefully consider how we undertake this research in the first place.

²⁵ This includes the ongoing debate regarding the ‘ontological turn’ in anthropology, which questions the idea that different worldviews are different representations of the world, and instead suggests that the differences constitute differences in worlds (Holbraad and Pedersen, 2017). Supporters of the ontological turn argue that we “should allow difference or alterity to challenge our understanding of the very categories of nature and culture themselves” (Heywood, 2017). This difference in perspective has the potential to impact how anthropologists carry out research, and how they understand their subjects in relation to themselves.

Although these are implications that may also affect non-selection-based cultural evolutionary approaches, it brings forth specific consequences for cultural selection modelling and thinking, with its language of ‘adaptation’ and ‘optimisation’.

4.3. Worries about Quantification

One possible objection to the consequences I have laid out here, in terms of how they factor into an inductive risk argument, is that the consequences of false positives are diffuse and difficult to quantify. Here, the thought is that articulations of the inductive risk carried by types of error usually have concrete consequences which allow us to make a trade-off between them. Typical examples of the consequences discussed include the harms to public health versus harms of overregulation in Douglas’ dioxins example, or harms of not detecting a cancer versus harms of over diagnosis in discussions of medical screening (Plutynski, 2017).

However, are the kinds of consequences involved really so different in the cultural selection case? In Douglas’ dioxins example, we are balancing the risks of overregulation against the risks of harms to human health. Perhaps, it is theoretically straightforward to quantify harms to human health: although in practice this is often difficult. The harms of overregulation, on the other hand, are incredibly difficult to spell out. Doing so would involve similar kinds of detailed analysis as described in the previous subsections, and would involve small contributions to harms to a spread out network of actors, that follow complex causal pathways.

The lesson we should take from this is that the diffuseness of the possible harms, and the difficulty we may face in quantifying them precisely, are not reasons to dismiss the role of inductive risk considerations in decision-making. Despite these issues, we are clearly able to both articulate the consequences of false positives and false negatives and envision some way of performing a trade-off between them, depending on our values.

5. Given the Consequences, Why not Abandon Cultural Selection?

If we take seriously the idea that these negative social and political consequences do emerge from cultural evolutionary work, and that these consequences do not arise, or arise in a lesser

degree, from alternative frameworks, then some might argue this is reason enough to simply abandon cultural evolution. This seems to be the attitude of cultural anthropologists such as Ingold, when they level the kinds of criticisms outlined in the previous section.

To some individuals, the kinds of social and political concerns articulated in Section 4 may represent a clear reason to avoid cultural evolutionary thinking, even in the best-case scenario where cultural evolution could radically transform our understanding of culture in a way that parallels the introduction of evolutionary theory into biology. To those that take this position, the structure of the argument presented here may be unnecessary, as they view a direct role for social and political values to be legitimate or warranted.

However, these kinds of criticisms are often dismissed or go unheard by those working in the field of cultural evolution. This may be in part due to the discomfort some feel in allowing social or political values to be used in dismissing a potentially epistemically-fruitful research programme. Here, parallels can again be drawn to research into gender and racial differences. Supporters of research into gender or racial differences rail against what they see as the illegitimate intrusion of social values into determining which research is pursued, and which theories are accepted. This, in part, is why those who criticise these research programmes focus not only on the non-epistemic consequences of this research, but also attend to the question of appropriate evidential thresholds. In these cases, typically in fact what we see is the importation of patriarchal or white supremacist social values to guide the setting of the evidential threshold to be much lower than would be used in related areas of research with no such social or political consequences (such as that described by Kitcher in the case of sociobiology, or in his 2003 book *Science, Truth and Democracy*).

This has relevance to the cultural selection case: although these kinds of critiques do not explicitly invoke inductive risk, they highlight the role of setting evidential standards that allows for non-epistemic values to play an indirect role. Perhaps framing it in this way makes the criticisms from anthropologists somewhat more intelligible to those who see promise in cultural evolutionary approaches: non-epistemic concerns become part of the necessary evaluation of cultural evolution as a broad explanatory framework.

There is a distinct benefit to this kind of framing that navigates the space between the two camps, in that it allows these types of criticisms to be recognised and considered.

Consideration of the inductive risk of pursuing or adopting cultural selection frameworks and

thinking should encourage firstly, greater attention to potential explanatory and epistemic gains, and secondly, greater reflexive evaluation of the relationship between researcher and subject. Much work within cultural selection has focused on whether, in principle, models can be fitted to certain cultural phenomena, and comparatively little work has focused on generating explanatory or practical gains. The negative social and political consequences of false positives should give us reason to raise the evidential or explanatory bar, and therefore create an impetus to closely consider these questions of explanation. Additionally, becoming clearer on the epistemic and practical benefits of cultural selection would reduce uncertainty in making these decisions, thereby reducing inductive risk. Additionally, the potential for negative social and political impact should spur cultural selection researchers to search for ways to minimise that impact, perhaps by drawing on tools for reflexive evaluation developed within ethnography.

6. Conclusion

I have argued here that inductive risk is a useful way of thinking about the decisions whether or not to pursue or to adopt both an evolutionary approach to culture in general and specific cultural evolution frameworks. This is because pursuing or not pursuing, or adopting or not adopting, cultural selection comes with associated non-epistemic consequences, arising from analogues to ‘false positives’ and ‘false negatives’; therefore, non-epistemic values will enter into this decision-making.

‘False negatives’, where we choose not to pursue or adopt cultural selection when in fact we could have made epistemic and explanatory gains, have both epistemic and non-epistemic consequences, which include being left with an inadequate understanding of cultural phenomena and missing out on potential practical benefits, perhaps in the field of innovation. ‘False positives’, where we pursue or adopt cultural selection when in fact there are little epistemic or explanatory gains to be had, bring about social and political consequences. These consequences stem from the construction of ‘thin’ descriptions of cultural phenomena and cultural actors, and the de-emphasising of human agency, and include the construction of narratives about people who have historically been denied the opportunity to craft their own narratives, and processes of dehumanisation and ‘othering’. These processes have material effects on individuals, and disproportionately target members of marginalised groups. We must

trade-off between these two sets of consequences, although how exactly that trade-off is calculated is not delineated here, and will depend on a multitude of factors.

What does this mean for cultural selection research? As previously outlined, I do not intend this argument as an argument for the wholesale dismissal of evolutionary approaches to culture on the grounds of potential social and political consequences. However, the acknowledgement that the pursuit and adoption of these frameworks come with potential costs should encourage careful examination and analysis of the expected explanatory gains from cultural selection research. Relatively little attention has been paid to the question of what explanatory gains we expect from utilising evolutionary models and thinking in the cultural context, especially when set within the context of existing approaches and methodologies from cultural anthropology, history, and sociology. Rather, focus has been directed towards questions of whether these cultural evolutionary approaches are broadly viable (whether theoretical models can be developed, whether these models display some level of fit with available data, or whether aspects of culture can be analogised to fit Darwinian principles), without taking the further step to interrogate their explanatory usefulness. If there are significant non-epistemic consequences to pursuing or adopting cultural evolutionary approaches, this provides additional rationale for close consideration of the expected epistemic and explanatory gains.

Drawing attention to a kind of inductive risk present in the evaluation of cultural selection allows for the role of both epistemic and non-epistemic values in guiding the pursuit or adoption of this research programme. This affords us a way of taking into account the kinds of social or political concerns voiced by anthropologists, within the evaluation of cultural evolution in general and within particular research programmes within cultural evolution itself.

Conclusion

Cultural selection is a significant region in the landscape of evolutionary approaches to culture. In this thesis I have addressed key conceptual challenges within cultural selection, arguing particularly for increased focus on the explanatory capacity of cultural selection models and assessment of the expected explanatory gains. Here, I will highlight several themes that have emerged throughout this thesis:

What Matters is Cultural Selection in Practice, not in Principle

The key question is not whether cultural selection can operate in principle in any given population, but what the explanatory payoffs are of invoking cultural selection. Cultural populations do indeed bear deep and significant differences from biological populations. Whilst on the face of it, this may seem like a major stumbling block to cultural selection approaches, I have used the example of reproduction to show that cultural systems can lack critical features of biological systems and yet still undergo cumulative selection. In the case of reproduction, cultural systems can instantiate the necessary features for cumulative selection (i.e., the production of novelty) without anything that resembles a reproductive process. Therefore, worries that culture is too dissimilar to biology for selection to take place are misplaced. Additionally, the lack of systematic definitions for key concepts, such as fitness and inheritance, should not cause us concern. Rather, we should be more concerned with the benefits of cultural selection ‘in practice’ than ‘in principle’.

The case of reproduction is highly suggestive of this, as reproduction is thought to be crucial to cumulative evolution in biological organisms, and yet is not necessary in culture. However, it may still be the case that there are other features which cultural populations must exhibit in order for cumulative selection to occur, even in principle, and typically do not.

Nevertheless, the argument I have provided in Chapter 1 regarding the role of reproduction should give use reason to believe that we should shift focus from determining whether cultural selection can take place in principle, and towards what the explanatory benefits of cultural selection are. Furthermore, potential cases of successful cultural selection explanations, such as the emergence of prosocial religions as characterised by Norenzayan et

al (2016), and expanded on in Chapter 3, are an indication that these ‘in practice’ and ‘in principle’ questions are separable. On the one hand, the ability for cumulative cultural selection to take place in principle does not mean that cultural selection explanations have explanatory value. On the other hand, deep disanalogies between (for example) cultural groups and biological groups do not prevent cultural selection frameworks from generating novel and useful explanations.

Cultural Selection has Major Explanatory Flaws

There has been a lack of attention thus far to the explanatory payoffs of cultural selection, and this is a crucial problem for cultural selection research. Cultural selection models have been applied in ways that yield little to no explanatory benefits: the case of the application of cultural selection to sustainability science in Chapter 2 is a striking demonstration of this. Although the requirement for cultural selection models to provide unique explanatory benefits that cannot possibly be achieved through alternative models is too high, in this case cultural selection models rely on existing historical or anthropological accounts to draw any explanatory power. Therefore, they do not even fulfil the weaker criterion that they lead to insights that have not been arrived at through other approaches.

The explanatory deficits of cultural selection as a research programme in its current state are wide-ranging: from its application in particular fields, to particular processes, to the social learning biases that underpin cultural selection models. Although cultural selection explanations can appear plausible on their face, they often do not stand up to scrutiny. The case of the Nuer and the Dinka in Chapter 3 is a clear example of this: not only is the cultural group selection account in tension with the ethnographic evidence, but cultural group selection does not provide a particularly powerful explanation here even if we take the anthropological facts at face value. Not only do particular applications of cultural selection fail to generate explanatory benefits, but the analysis of the formal models of cultural group selection in Chapter 3 give us reason to believe that some of the processes of cultural group selection in themselves are not even capable of producing meaningful explanatory payoffs.

One key insight I have argued for is the necessity of an explicit comparison between cultural selection and alternative frameworks. When pinning down the explanatory gains from cultural selection models, we cannot analyse them in isolation. Instead, we should situate cultural selection within the context of the multiplicity of existing approaches to culture. This

involves identifying the unique explanatory insights we should expect to gain from cultural selection, that we do not or cannot gain from alternative frameworks. Authors such as Alex Mesoudi have promoted the quantitative nature of cultural evolution (and cultural selection) work: the ability to construct mathematical models certainly places cultural selection in stark contrast with much of cultural anthropology. However, there are several domains where cultural selection has been suggested as an explanation, such as the behaviour of firms within a market, where quantitative work from a social sciences perspective is ongoing and successful. Rather, I have argued that the key explanatory lacunae cultural selection models should aim to fill is those left by intention-based explanations. Where goal-directed, or intention-based explanations fail or falter, cultural selection will have a distinct contribution to make.

The lack of explicit identification of the benefits of cultural selection over intention-based explanations has been a recurring issue within cultural selection work. I have used historical or anthropological accounts, or simple goal-directed models, to demonstrate in various ways how cultural selection explanations fail to do better than their alternatives (and in some cases, such as in the examples from the prestige bias literature in Chapter 4, perform worse). However, there are some examples where cultural selection explanations look promising: the case of cassava processing outlined by Henrich may be one such case. Here, Henrich is clear as to why an intention-based model would struggle to explain particular features of the case. Turning to these questions of explanatory gains in an explicit and thorough way is an important step in developing cultural selection models with significant epistemic and practical payoffs.

The Commitments of Cultural Selection are at Odds with Empirical Evidence

Not only do cultural selection frameworks frequently struggle to provide explanatory power, but also their models often come with implausible assumptions or commitments. Of course, all models make use of idealisations and distortions. However, I have shown that for cultural selection models, these idealisations are doing important explanatory work. Once we relax these commitments, in order to bring them closer in line with the real world, the explanatory power of these models fades away. I have argued that this is the case both for formal modelling work in cultural group selection (Chapter 3), and for accounts of prestige bias (Chapter 4).

This gives us an additional reason to favour intention-based explanations for cultural phenomena over cultural selection explanations, where both explanations provide similar payoffs. This is because invoking a cultural selection explanation in this case may well involve making a set of assumptions that we have evidence to think do not hold. In contrast, intention-based explanations can provide the same explanatory power without necessitating similar assumptions (as in the prestige bias case).

Social and Political Values should enter into our Assessment of Cultural Selection

Lastly, we should take non-epistemic concerns seriously. Wariness on the part of cultural anthropologists regarding the cultural evolution research programme appears to primarily stem from these non-epistemic concerns. However, they have not been engaged with in any meaningful way by cultural evolution researchers themselves. The inductive risk framework outlined in Chapter 5 provides a way for values to have a legitimate influence over the course of cultural selection research. I have shown that we should expect negative social and political consequences to arise from pursuing or adopting cultural selection frameworks, and that attending to these consequences warrants raising the evidential bar for pursuing or adopting cultural selection frameworks.

This provides even more motivation for the explicit identification of explanatory benefits that I have advocated for in Chapters 2, 3 and 4. Additionally, taking the impact of (for example) ‘othering’ seriously will have positive consequences for the epistemic payoffs of cultural selection. We can see this from the Fijian food taboos case, and from the case of the Nuer and the Dinka. In the Fiji case, ‘othering’ is a possible explanation for the intuitive appeal of a cultural selection explanation, allowing us to overlook its explanatory deficits. In the case of the Nuer and the Dinka, how we understand relationships between the groups appear to have been shaped by colonial narratives. This has impacted the plausibility of a cultural group selection explanation here. In both cases, attention to the social and political values that shape research could have yielded greater epistemic dividends.

Cultural selection is a thriving research programme, but one in which critical conceptual challenges remain. In this thesis I have made necessary clarifications to the cultural selection framework. In particular, I have argued for explicit attention to be paid to the explanatory benefits of cultural selection over and above alternative frameworks. Assessment of the

explanatory gains of cultural selection, and contrasts with existing approaches to culture, have been neglected in the literature thus far. Cultural selection cannot yield epistemic and practical benefits unless these explanatory considerations are taken seriously. Additionally, the potential for negative social and political consequences should be a further reason to carefully consider the expected explanatory gains.

Despite concerns regarding the explanatory payoffs of cultural selection, cases of arguably successful cultural selection explanations indicate that cultural selection could have a role to play in understanding key aspects of culture, and generating novel and important insights. This thesis has argued for ways in which this potential could be realised. There is much more that could be said, in order to (for example) comprehensively evaluate aspects such as cultural group selection, and to systematically identify the social and political effects of cultural selection research. Future work, both empirical and theoretical, which hones in on the explanatory benefits of cultural selection models in particular cases, draws careful comparisons with available alternatives, and takes seriously the role of the social and the political, could bring the promises of cultural selection to fruition.

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